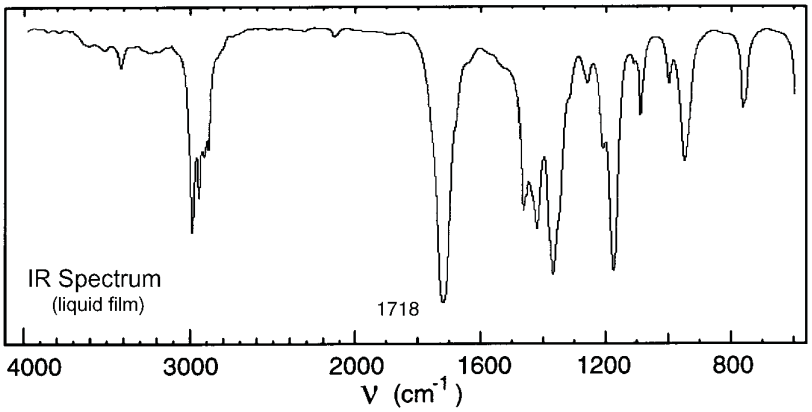
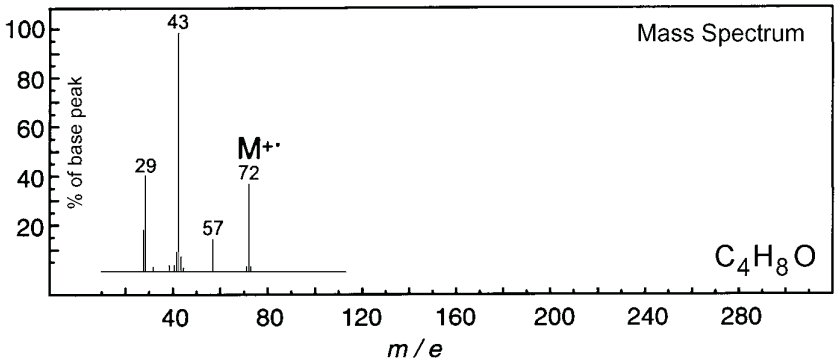
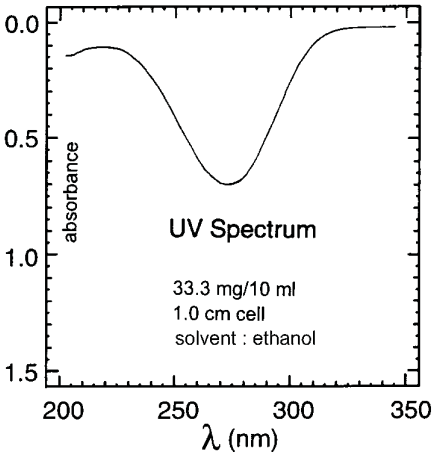
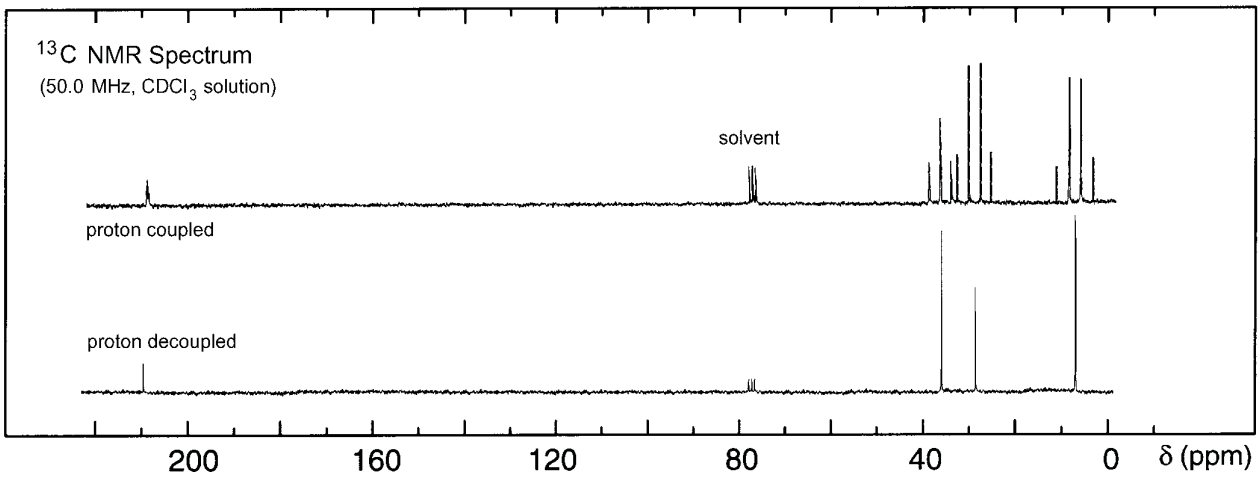
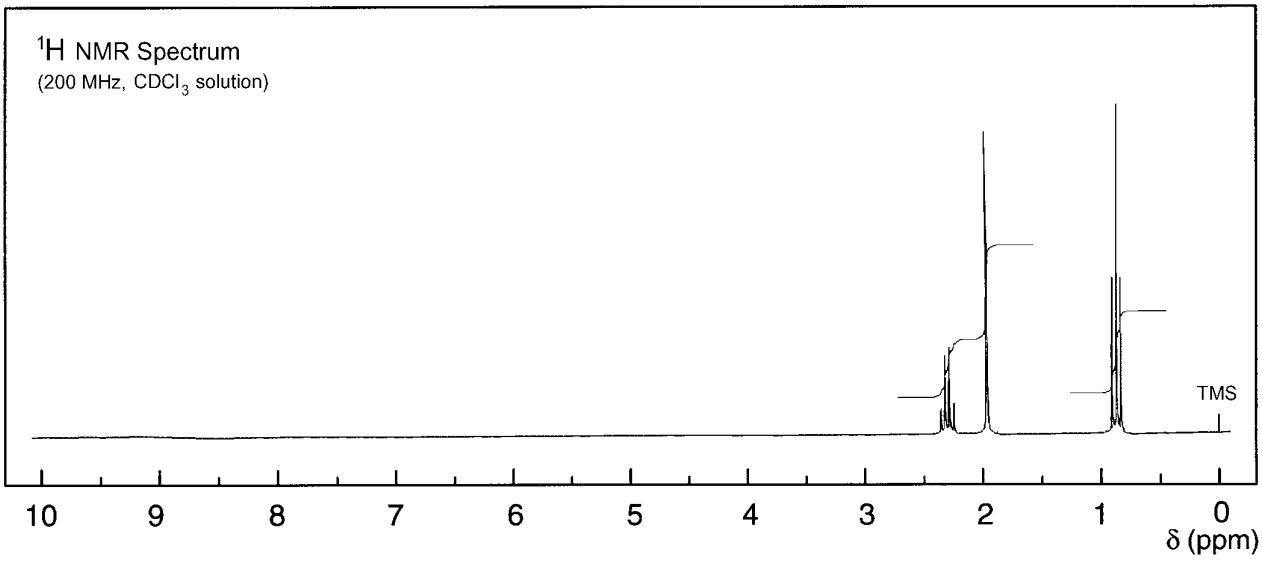
Problem 1

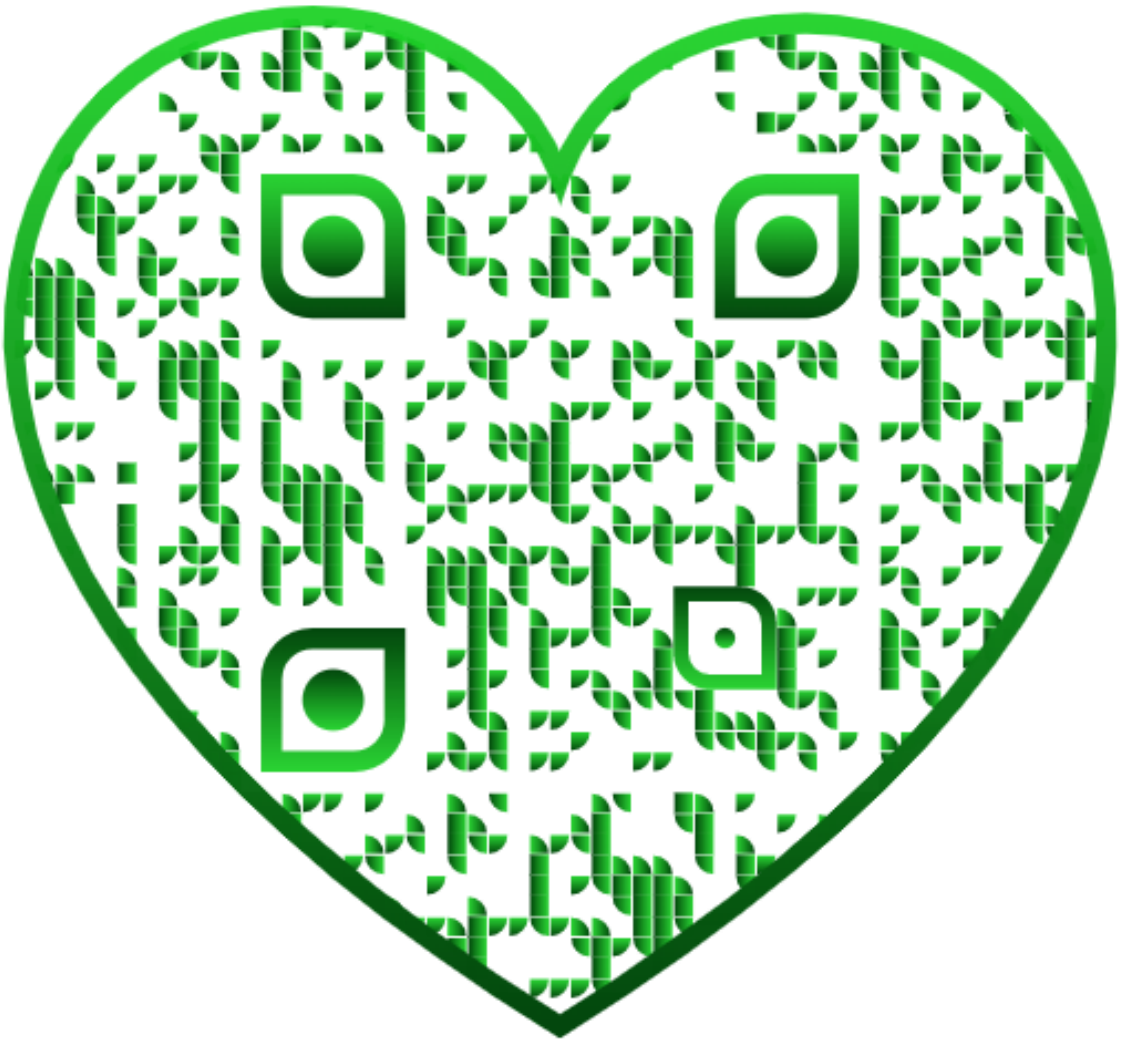

IR Spectrum
(liquid film)
1718
4000
3000
2000
1600
1200
800
ν (cm-1)


Mass Spectrum
% of base peak
100
80
60
40
20
43
29
M+·
72
57
C4H8O
40
80
120
160
200
240
280
m/e

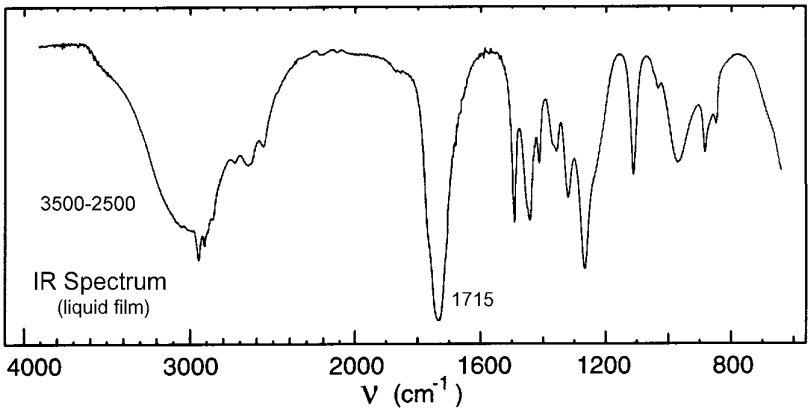

absorbance
0.0
0.5
1.0
1.5
UV Spectrum
33.3 mg/10 ml
1.0 cm cell
solvent : ethanol
200
250
300
350
λ (nm)

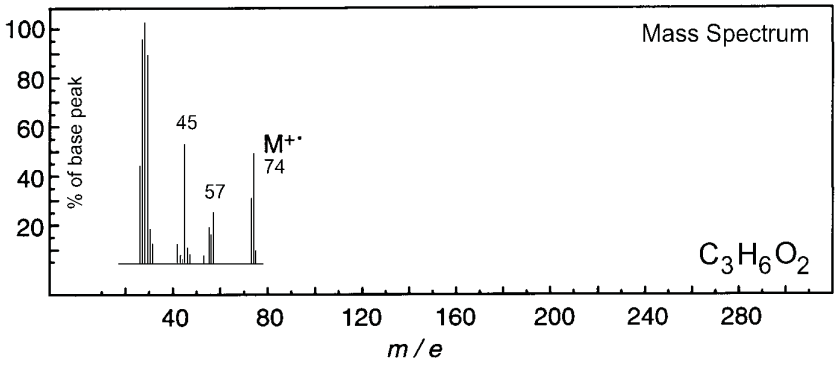

13C NMR Spectrum
(50.0 MHz, CDCl3 solution)
solvent
proton coupled
proton decoupled
200
160
120
80
40
0
δ (ppm)


1H NMR Spectrum
(200 MHz, CDCl3 solution)
TMS
10
9
8
7
6
5
4
3
2
1
0
δ (ppm)

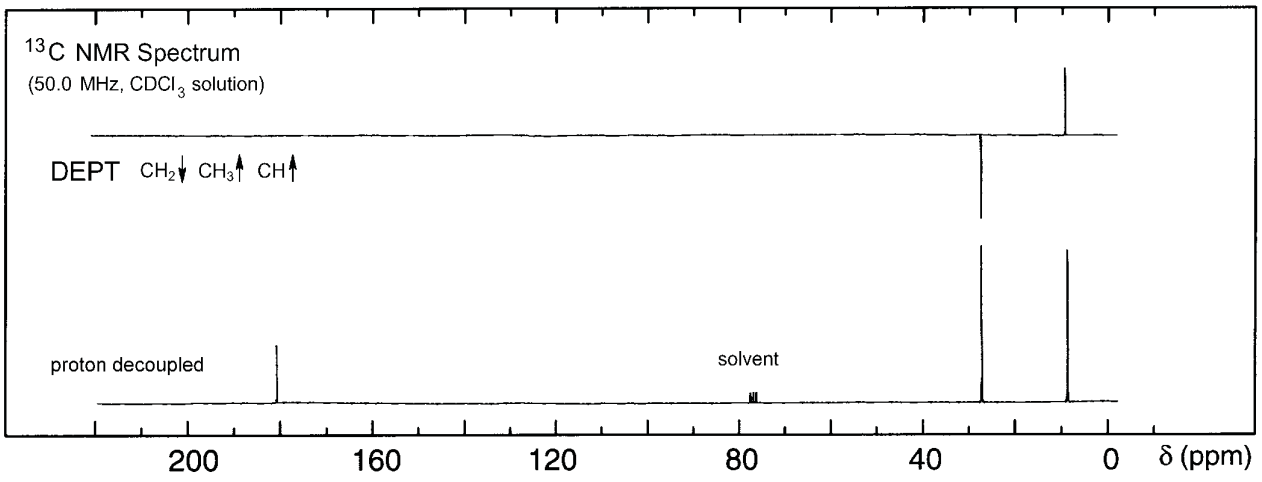


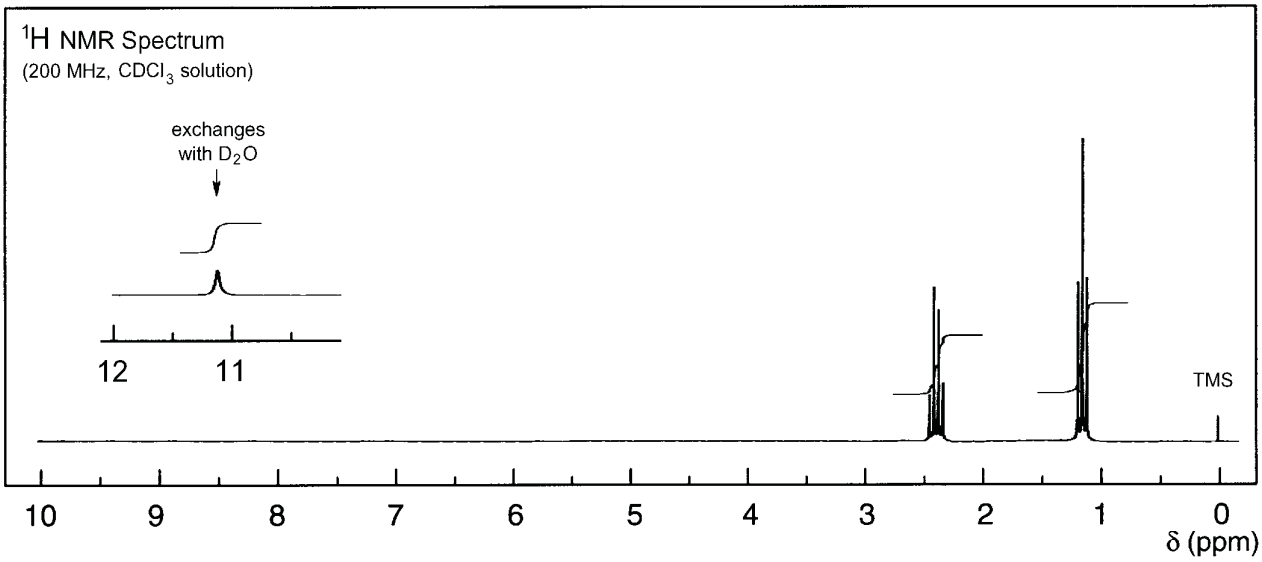
Problem 2



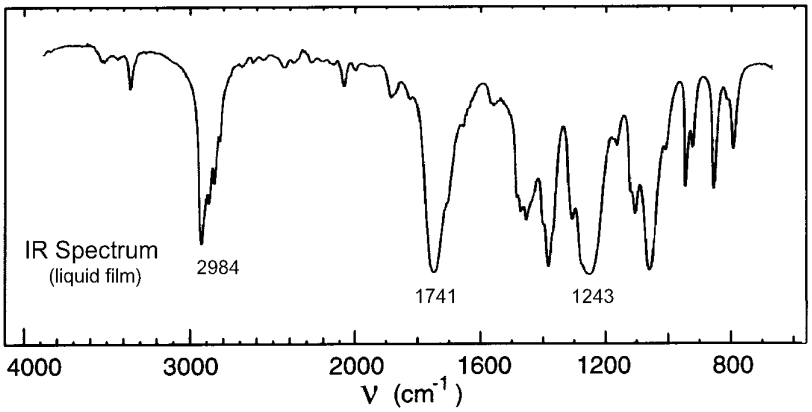


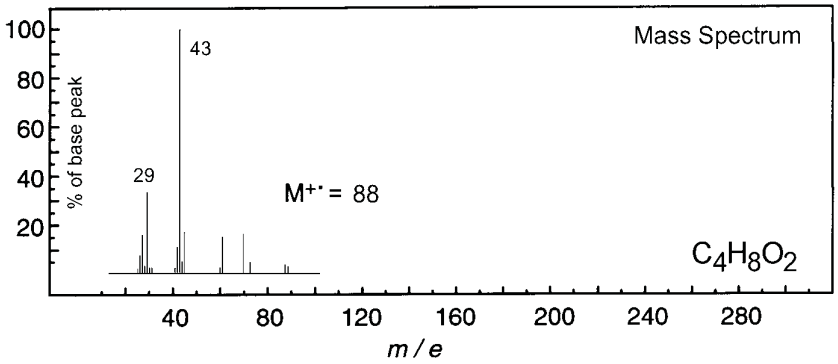
No significant UV absorption above 220 nm

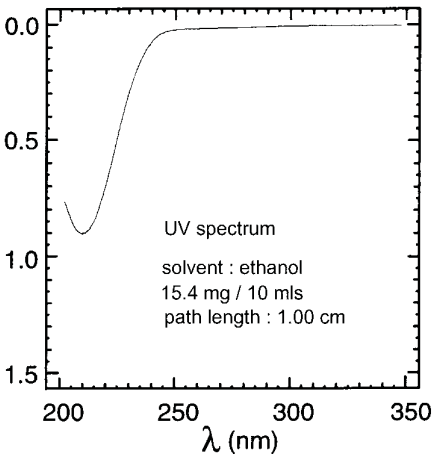


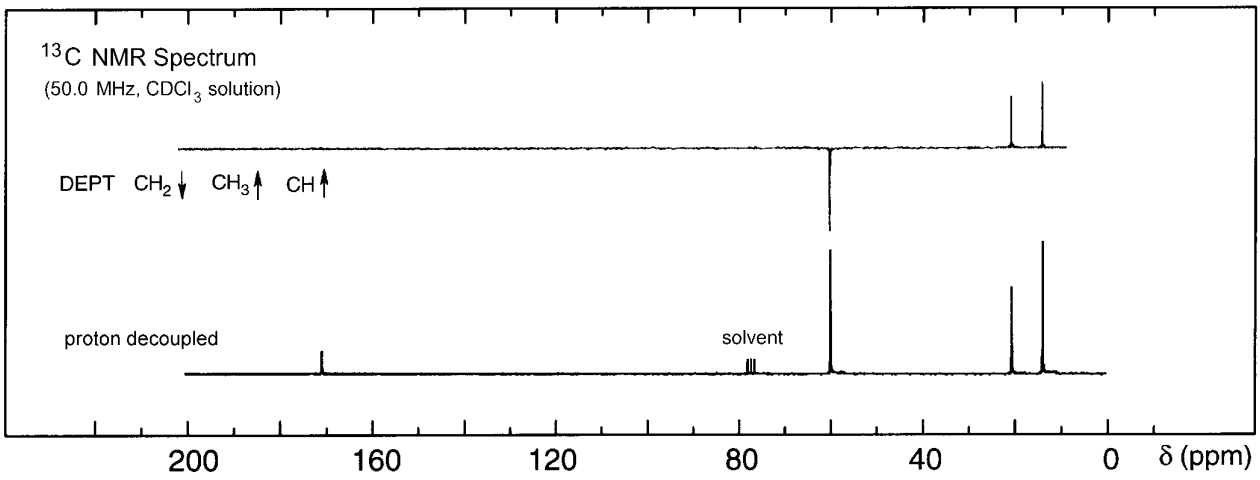


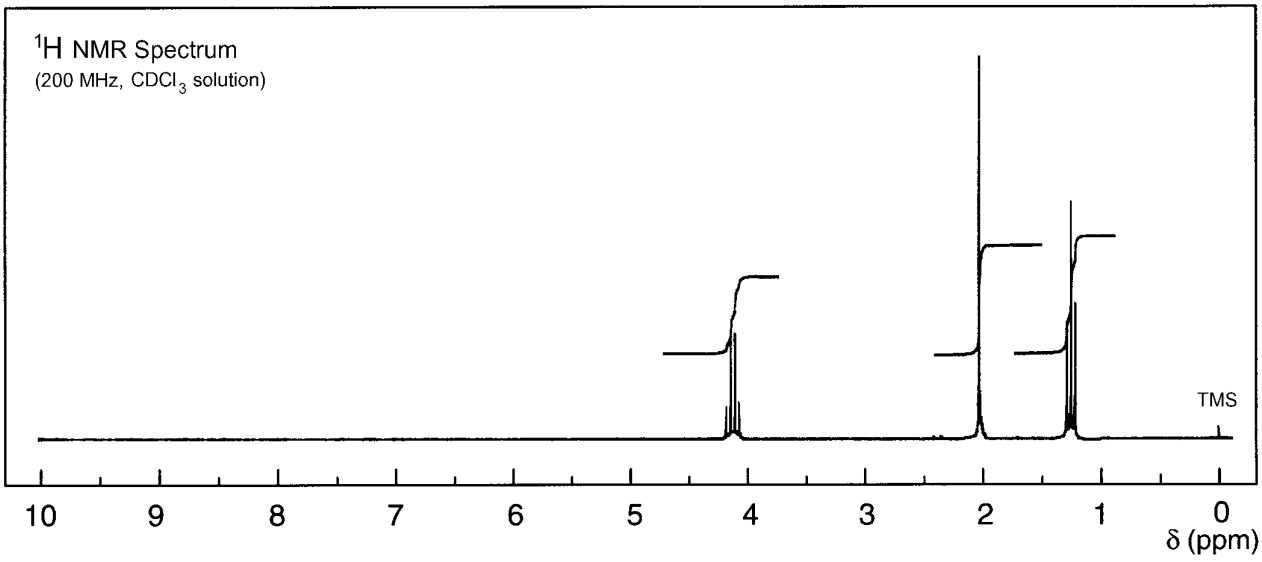
Problem 3


IR Spectrum
(liquid film)
2984
1741
1243
4000
3000
2000
1600
1200
800
ν (cm-1)

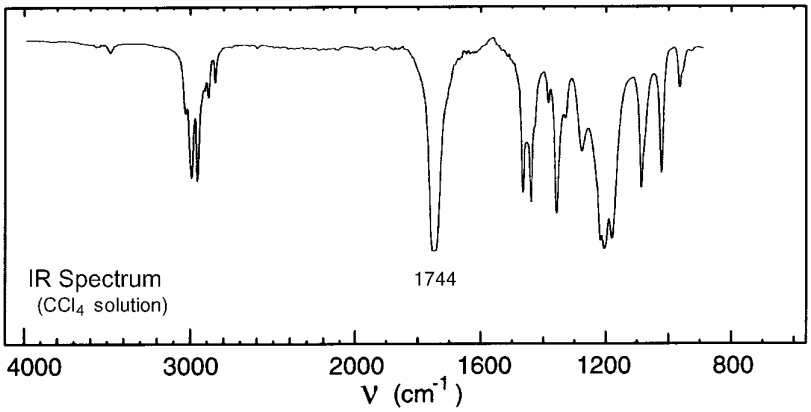

Mass Spectrum
% of base peak
100
80
60
40
20
43
29
M+· = 88
C4H8O2
40
80
120
160
200
240
280
m/e

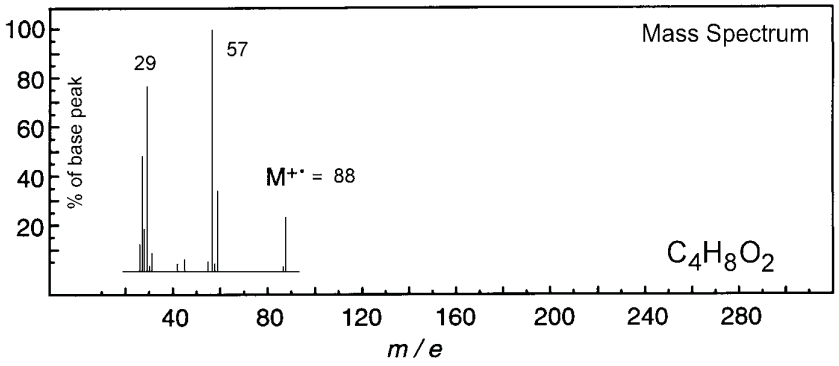

0.0
0.5
1.0
1.5
UV spectrum
solvent : ethanol
15.4 mg / 10 mls
path length : 1.00 cm
200
250
300
350
λ (nm)


13C NMR Spectrum
(50.0 MHz, CDCl3 solution)
DEPT CH2 CH3 CH
proton decoupled
solvent
200
160
120
80
40
0
δ (ppm)

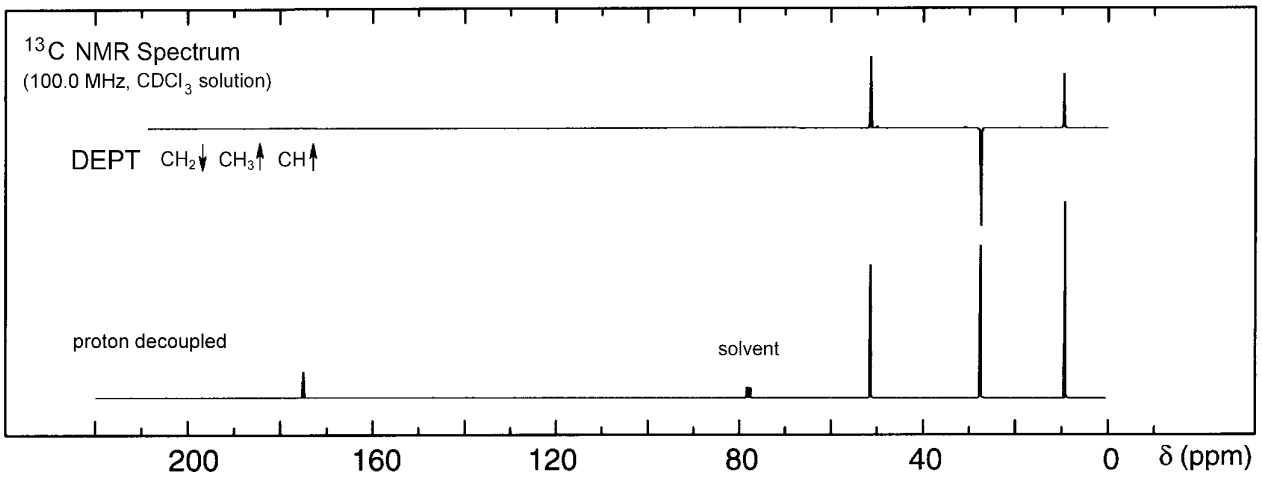

1H NMR Spectrum
(200 MHz, CDCl3 solution)
TMS
10
9
8
7
6
5
4
3
2
1
0
δ (ppm)

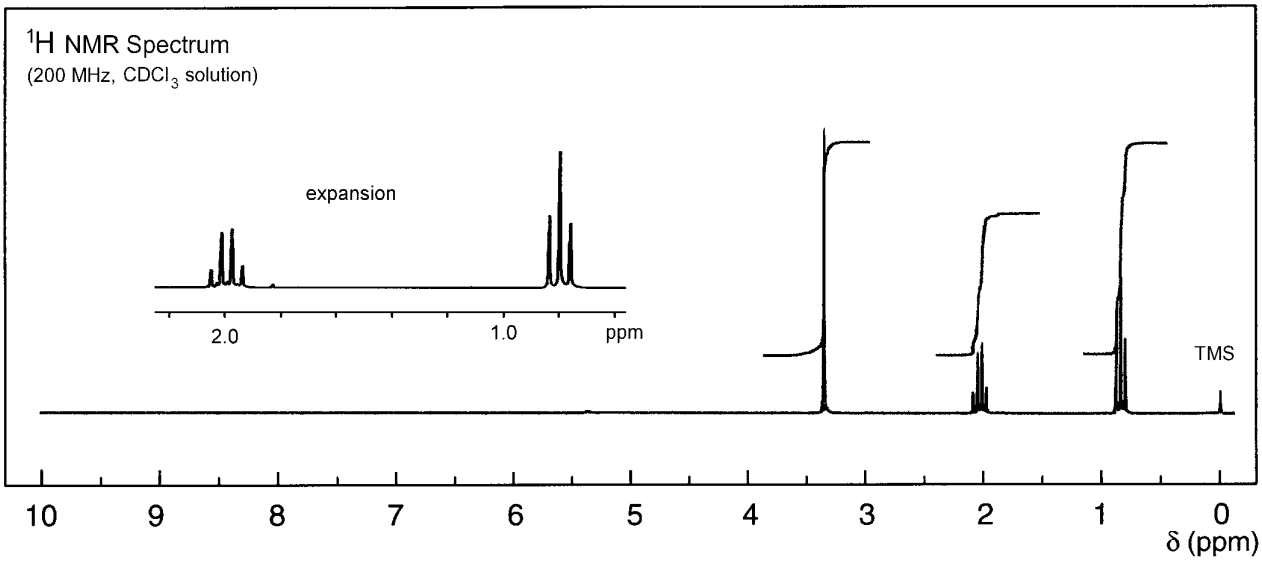
Problem 4



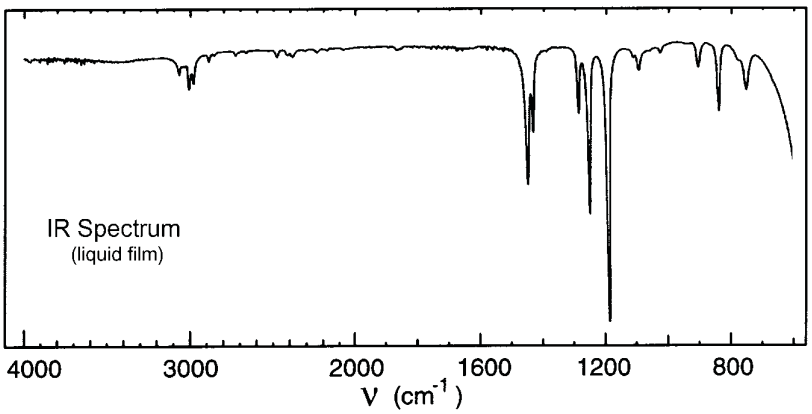


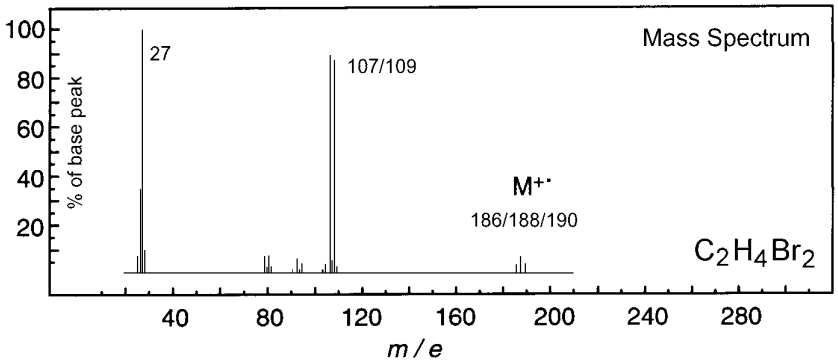
No significant UV absorption above 220 nm



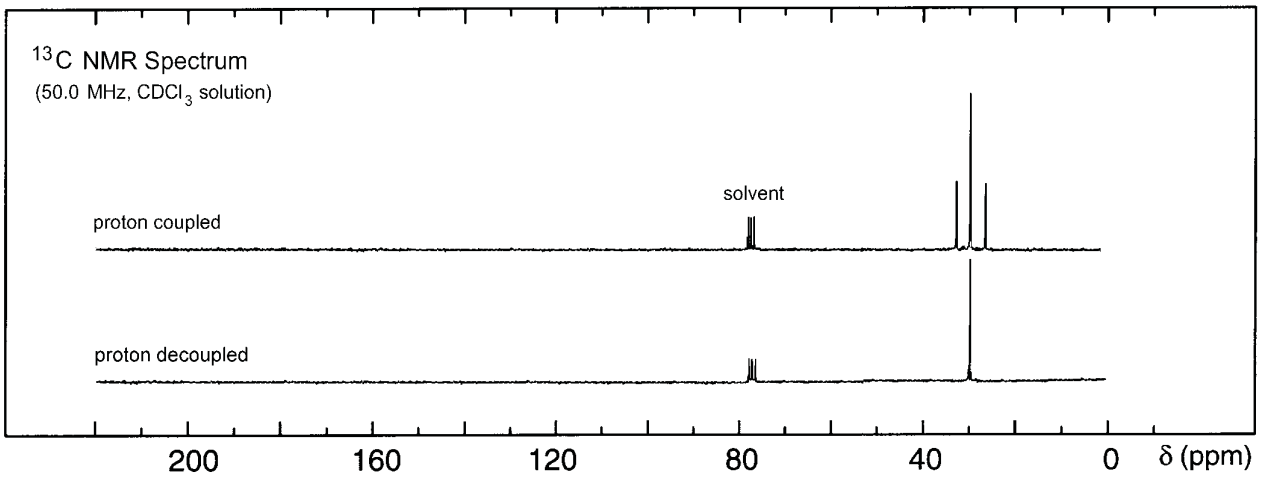


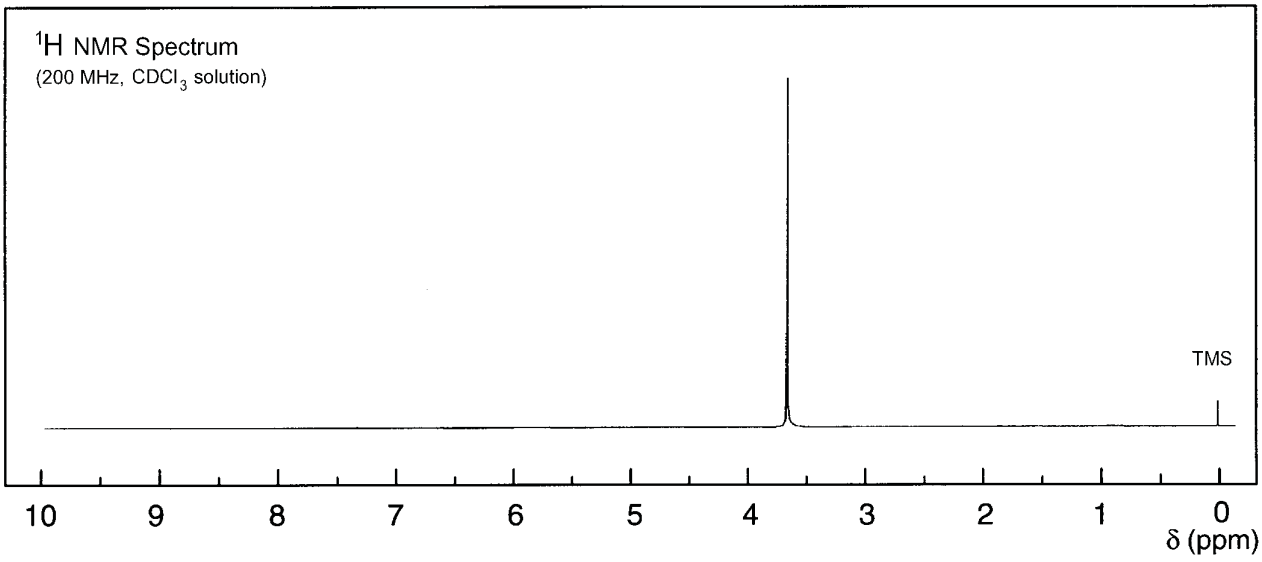
Problem 5



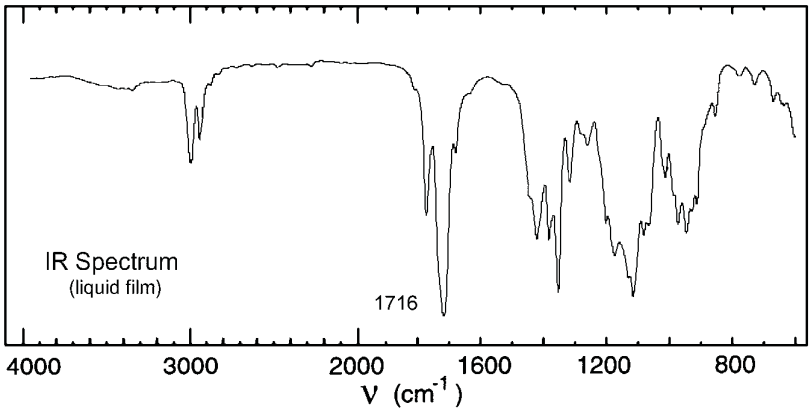


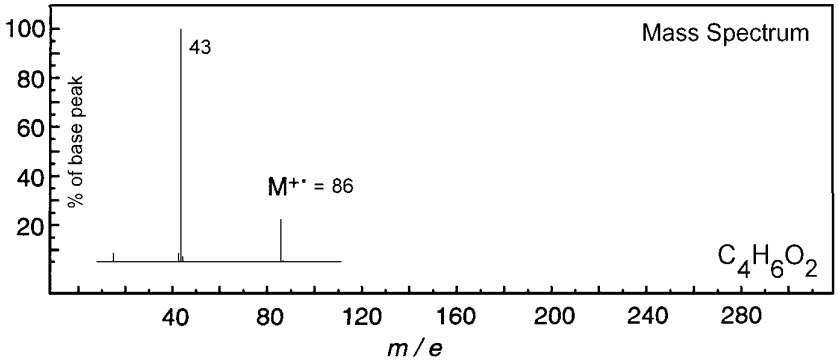
No significant UV absorption above 220 nm





Problem 6

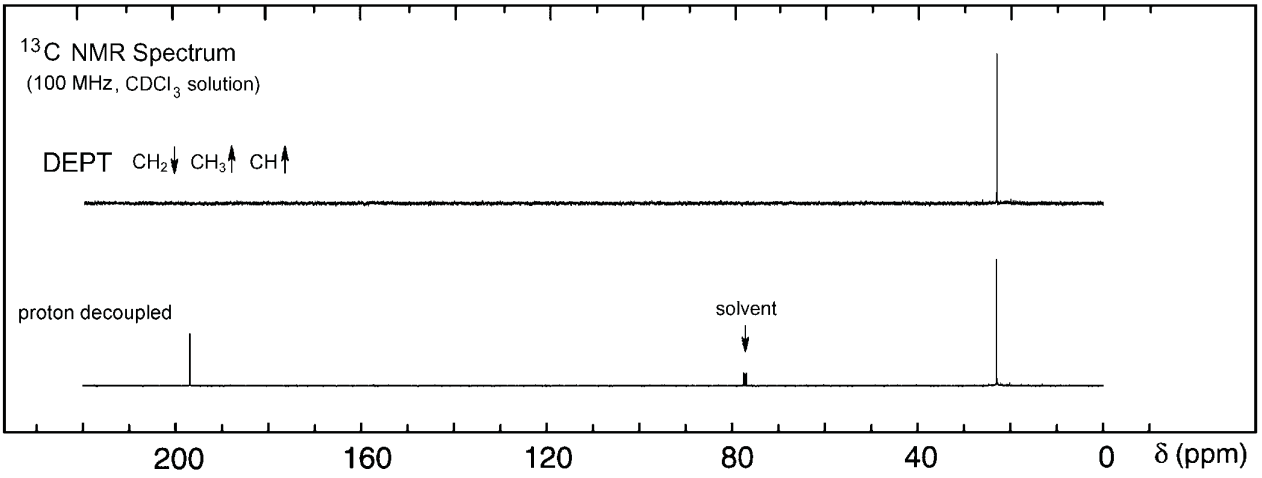


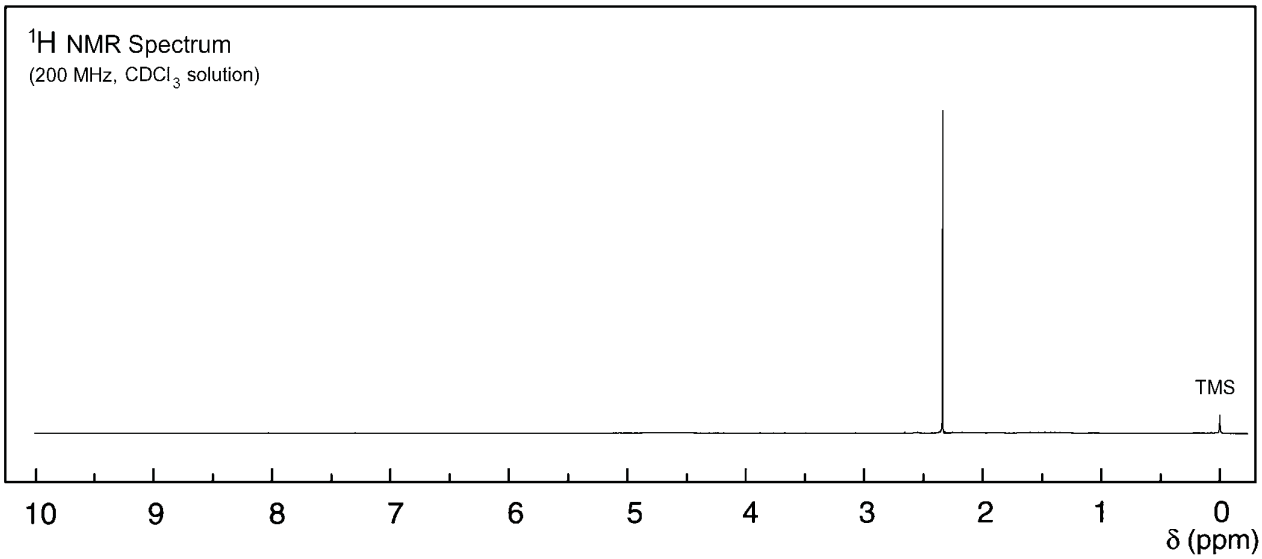


UV Spectrum

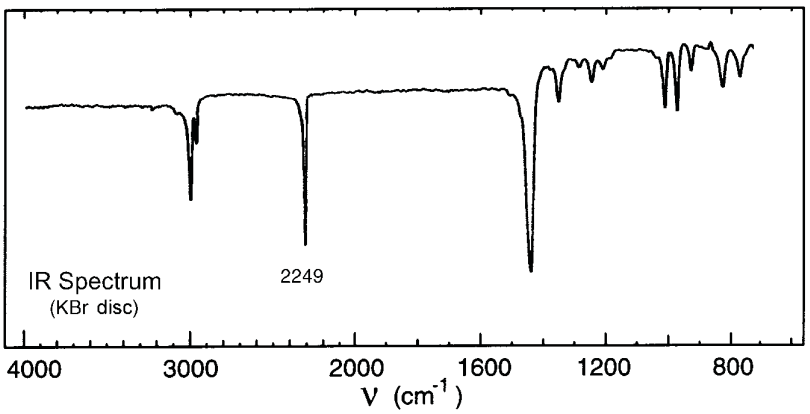
λ_{max} 289 nm ($\log_{10}\varepsilon$ 1.4)

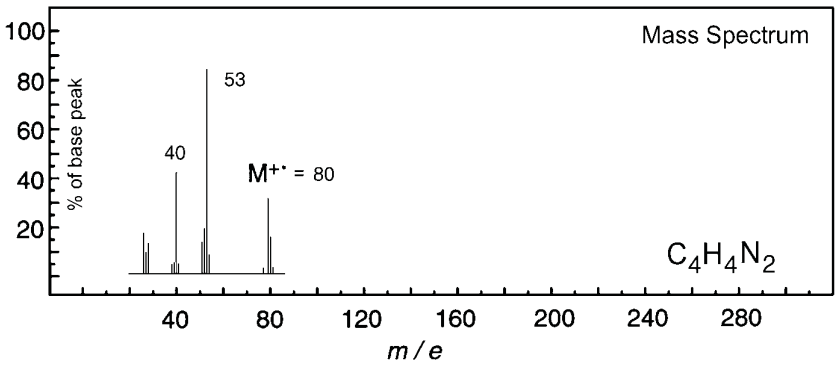
solvent : methanol



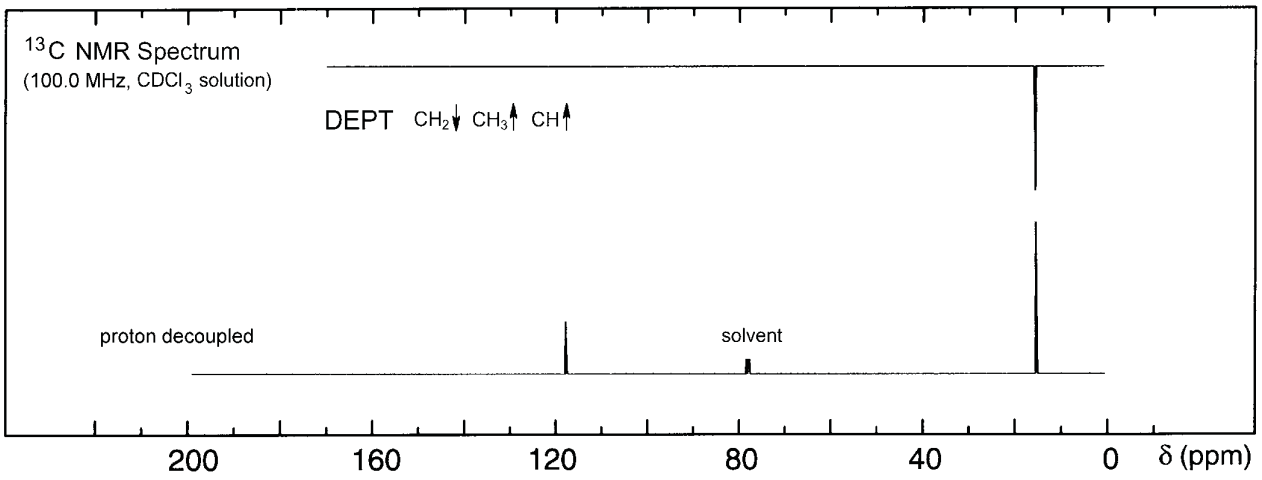


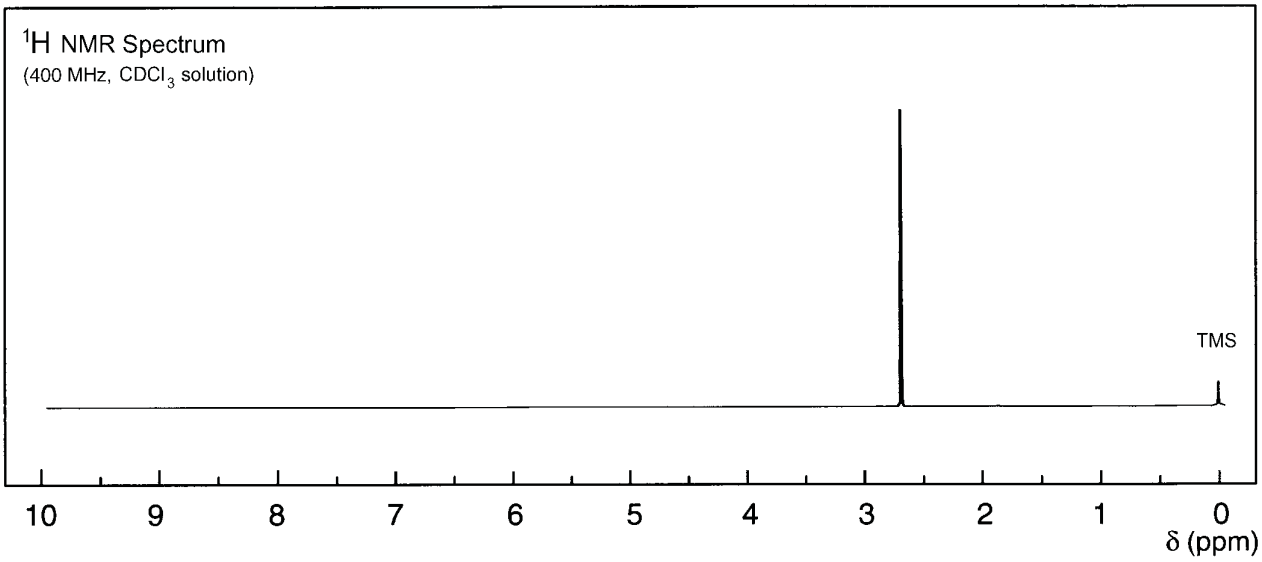
Problem 7



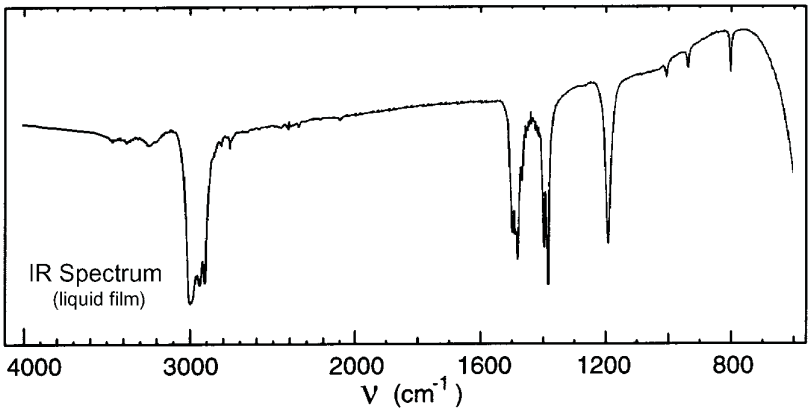


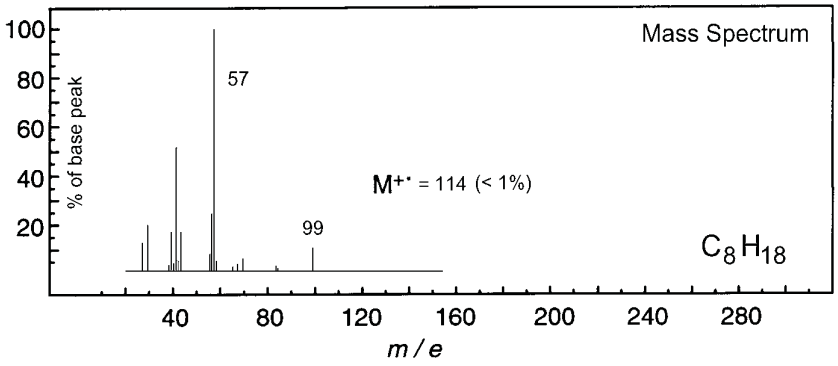
No significant UV absorption above 220 nm



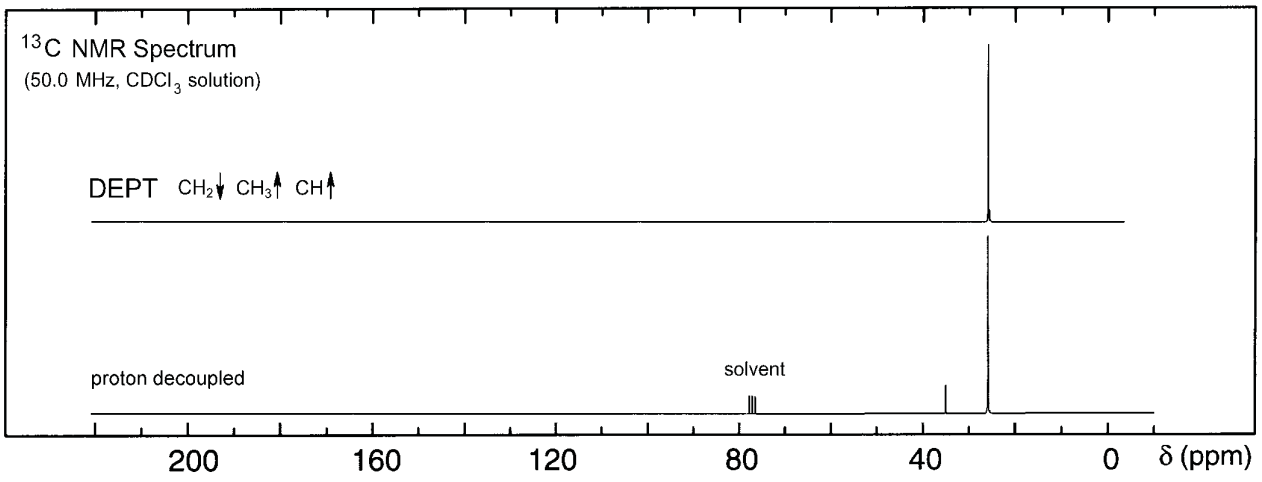


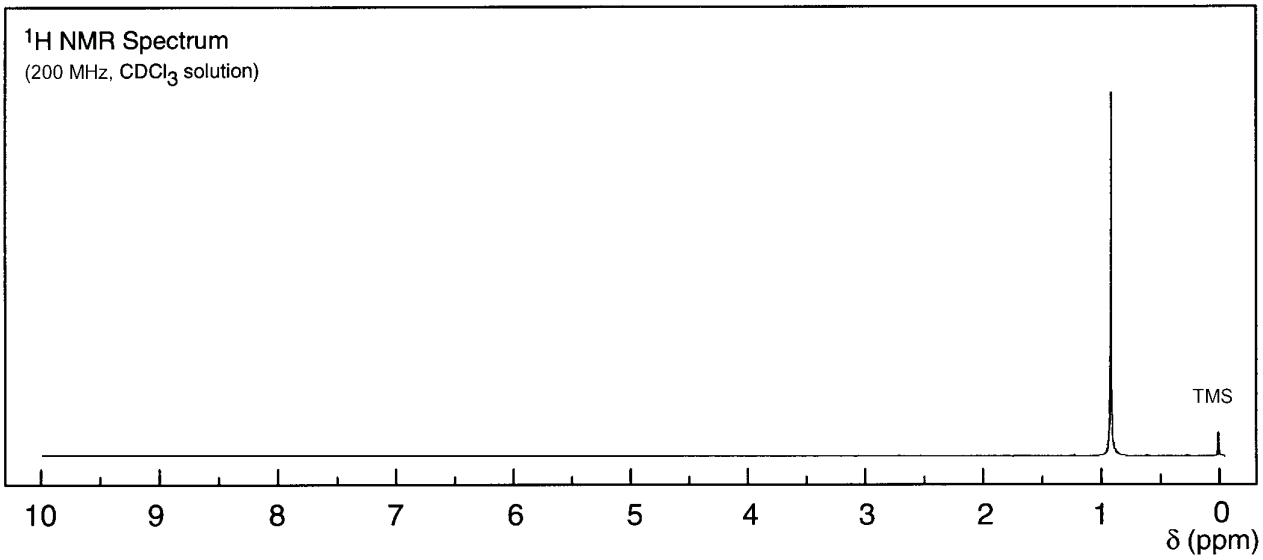
Problem 8



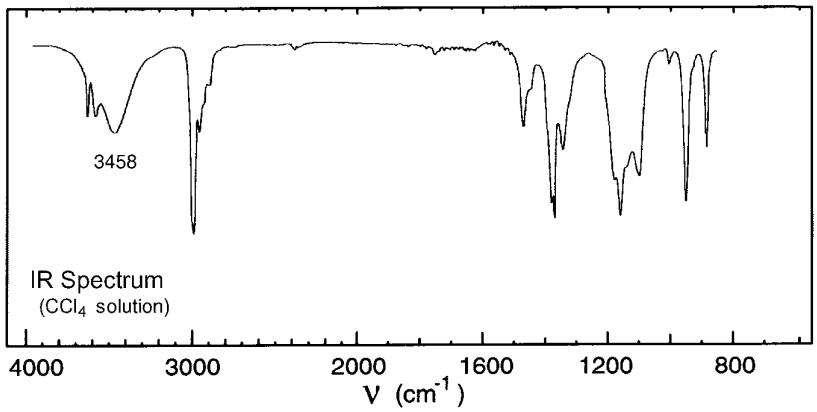


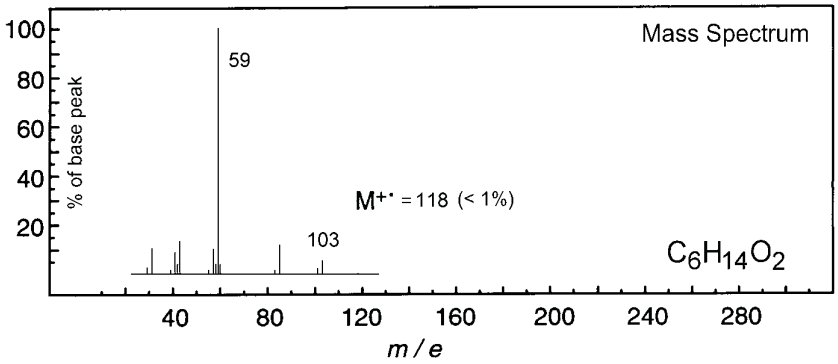
No significant UV absorption above 220 nm



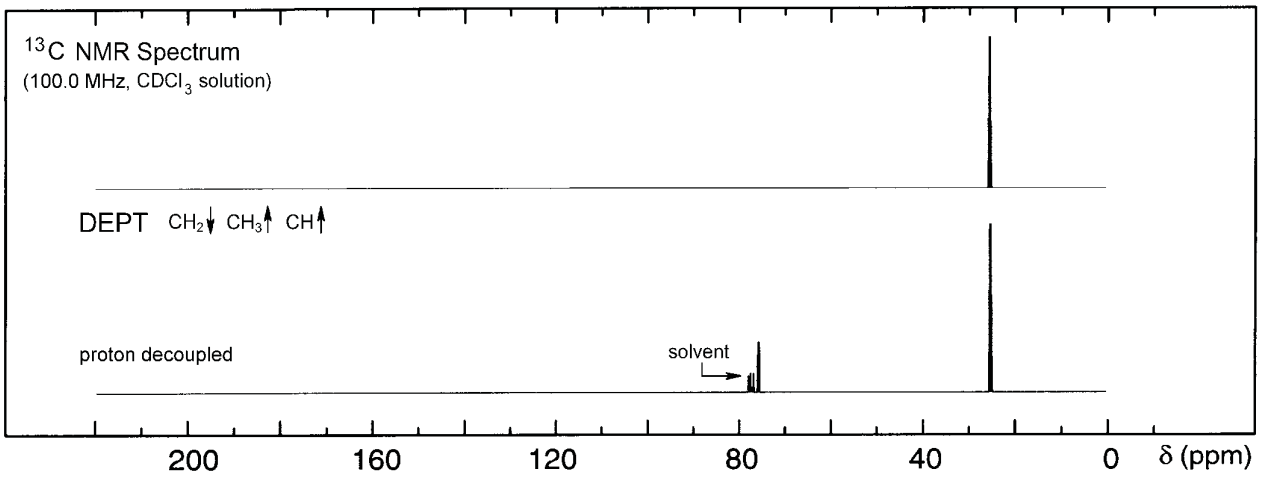


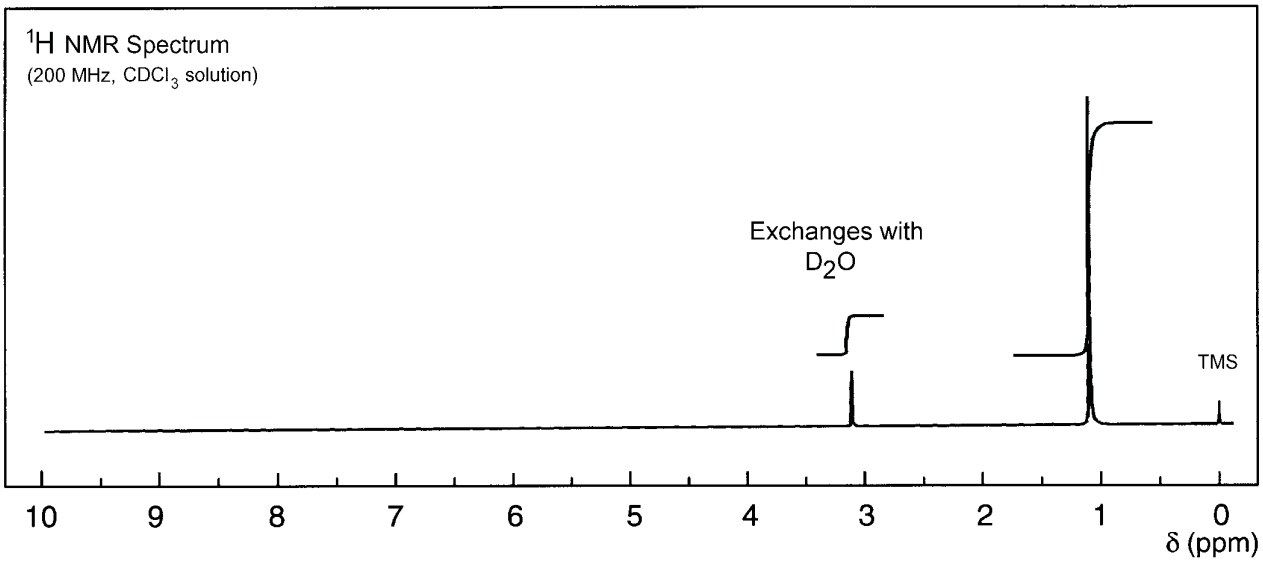
Problem 9



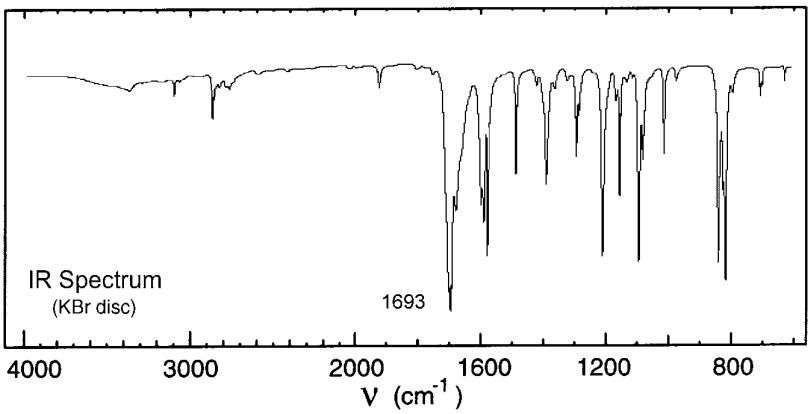


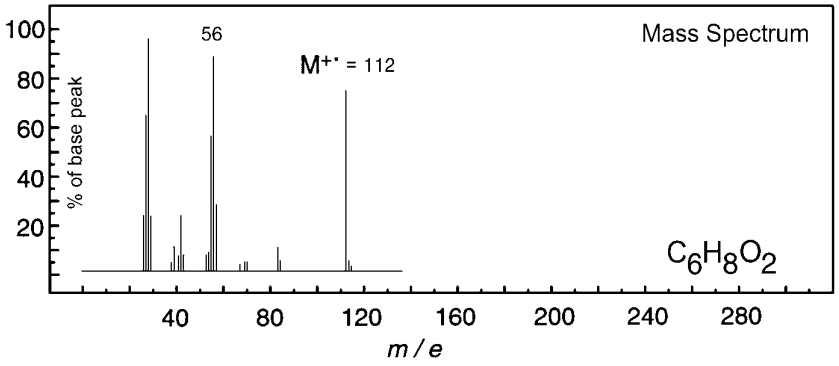
No significant UV absorption above 220 nm



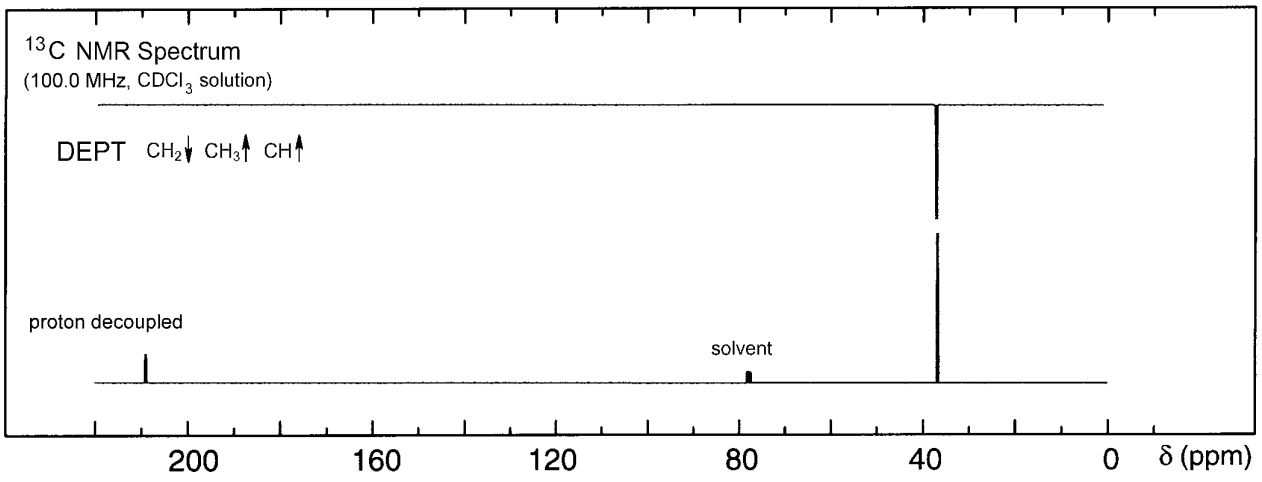


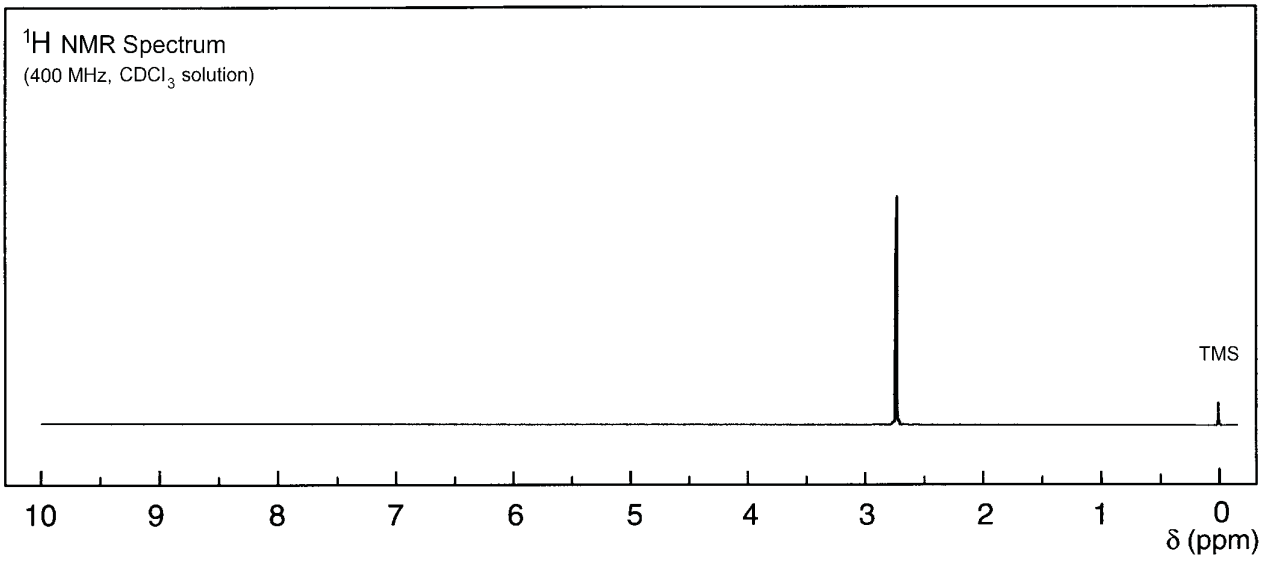
Problem 10



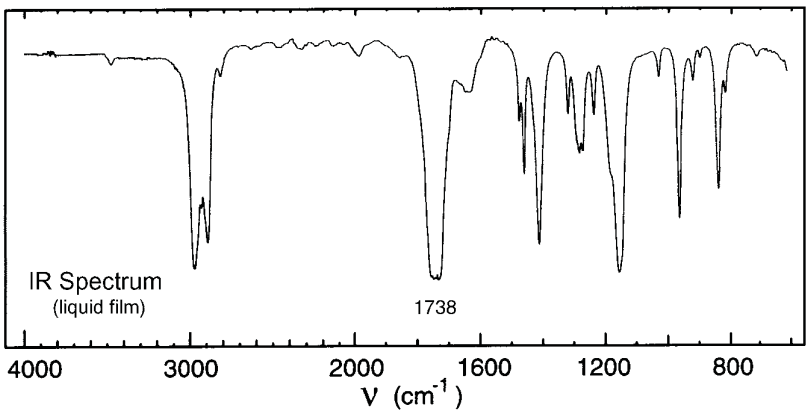


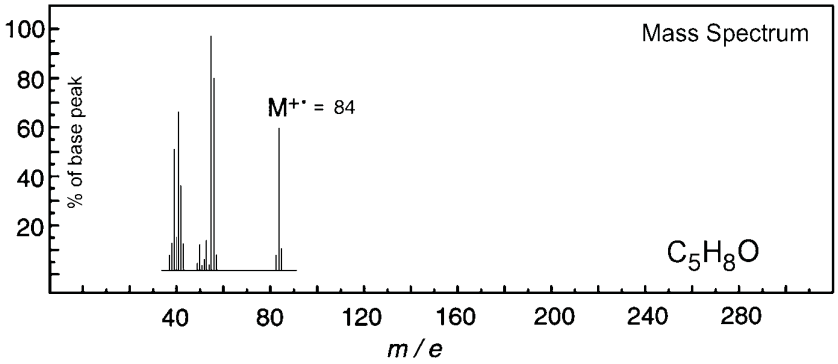
No significant UV absorption above 220 nm



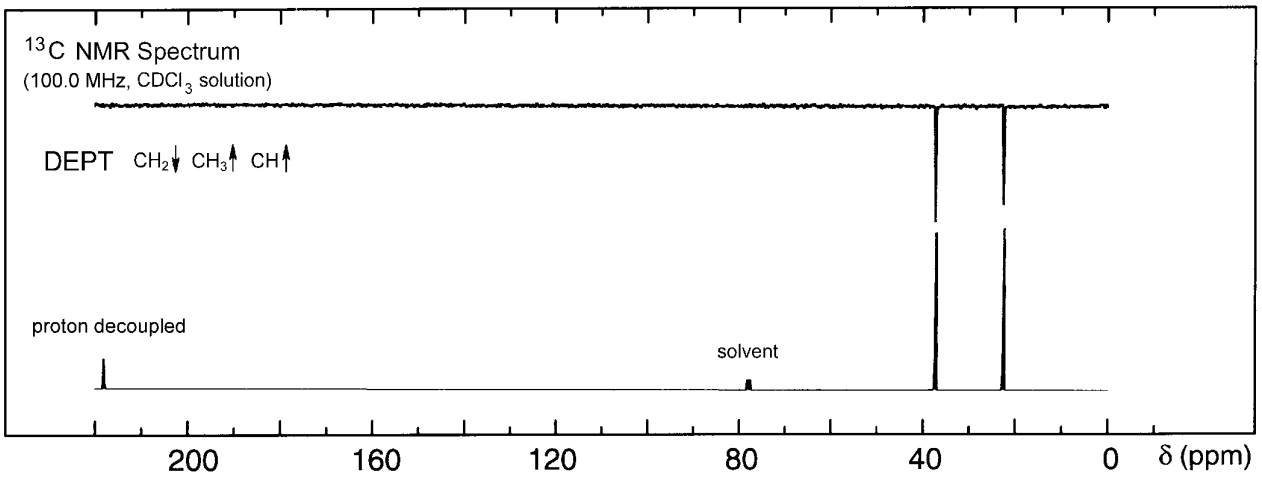


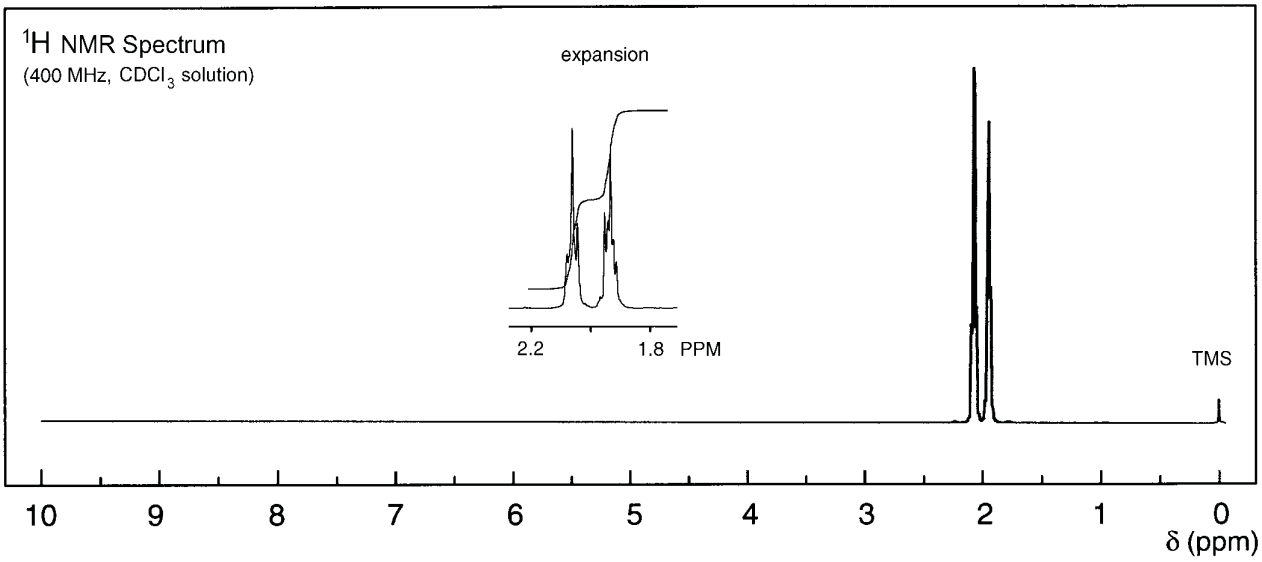
Problem 11



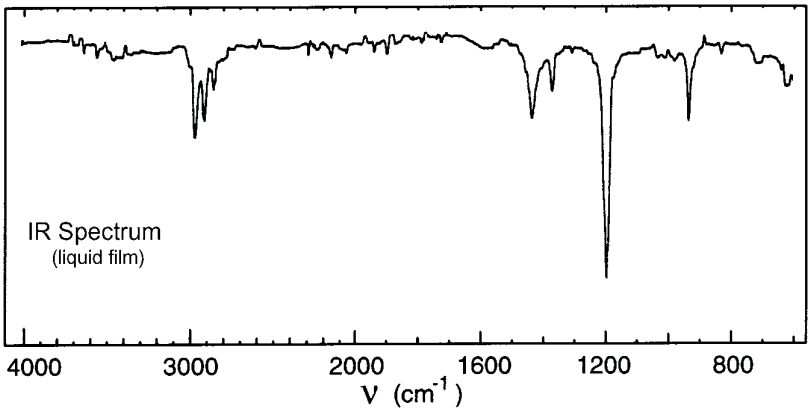


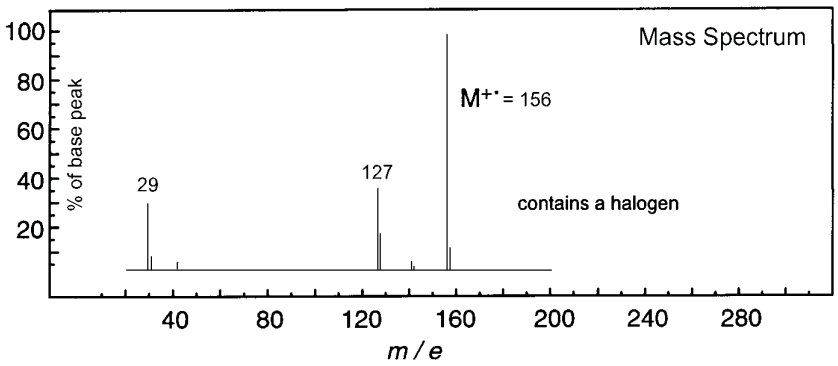
No significant UV absorption above 220 nm

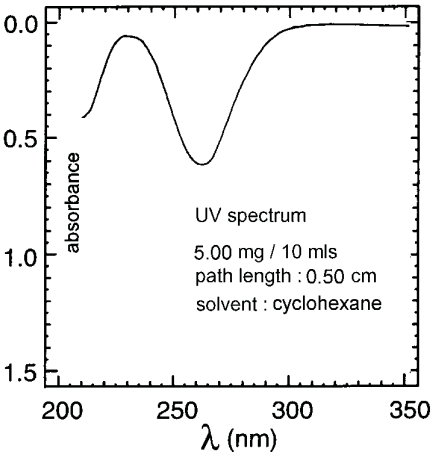


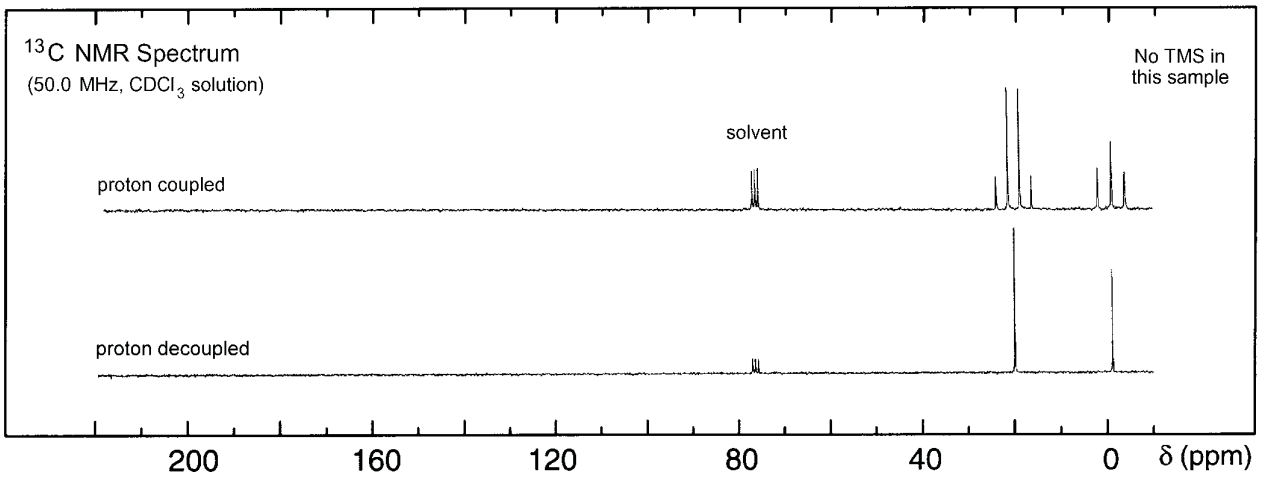


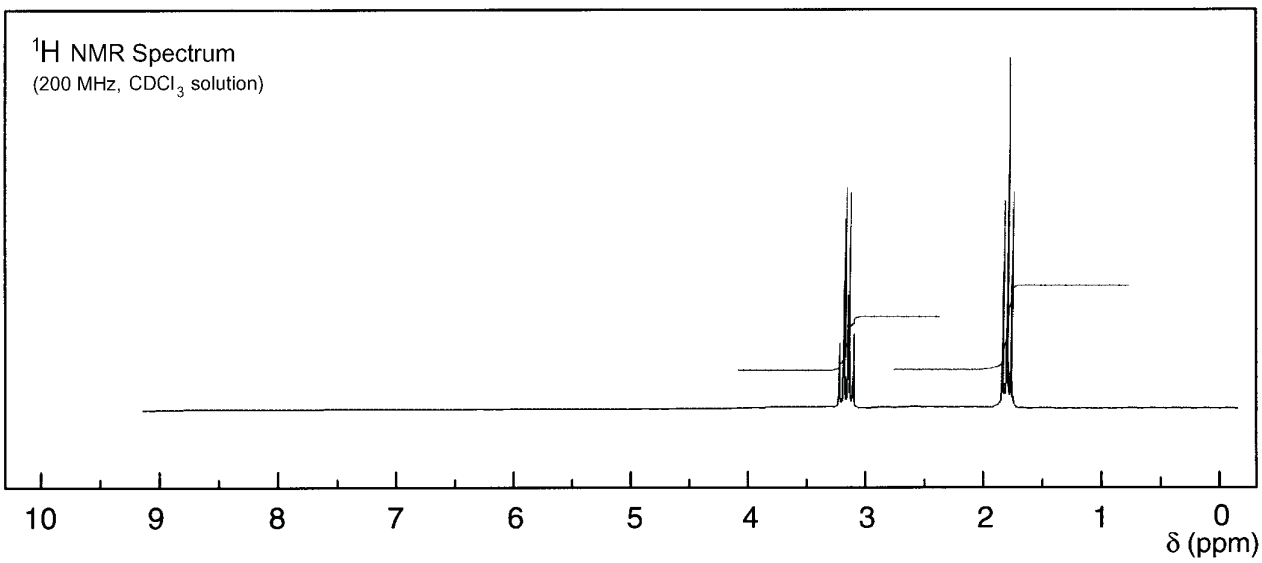
Problem 12


IR Spectrum
(liquid film)
4000
3000
2000
1600
1200
800
ν (cm-1)

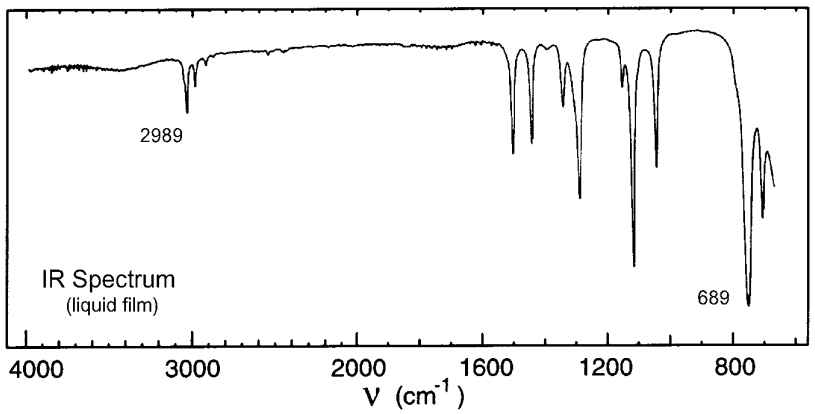

Mass Spectrum
% of base peak
M+• = 156
29
127
contains a halogen
100
80
60
40
20
40
80
120
160
200
240
280
m / e

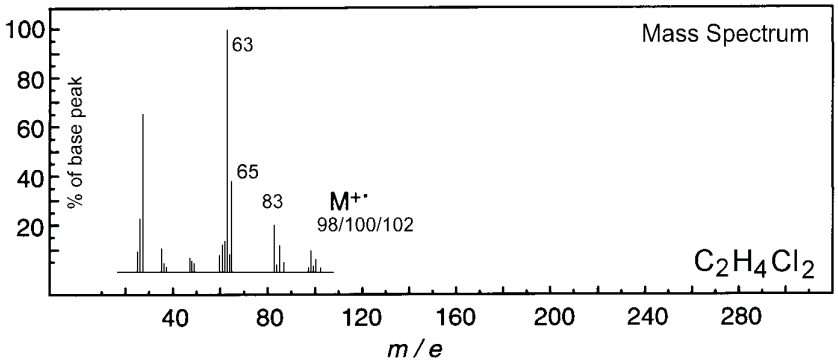

absorbance
UV spectrum
5.00 mg / 10 mls
path length : 0.50 cm
solvent : cyclohexane
0.0
0.5
1.0
1.5
200
250
300
350
λ (nm)


13C NMR Spectrum
(50.0 MHz, CDCl3 solution)
No TMS in
this sample
solvent
proton coupled
proton decoupled
200
160
120
80
40
0
δ (ppm)

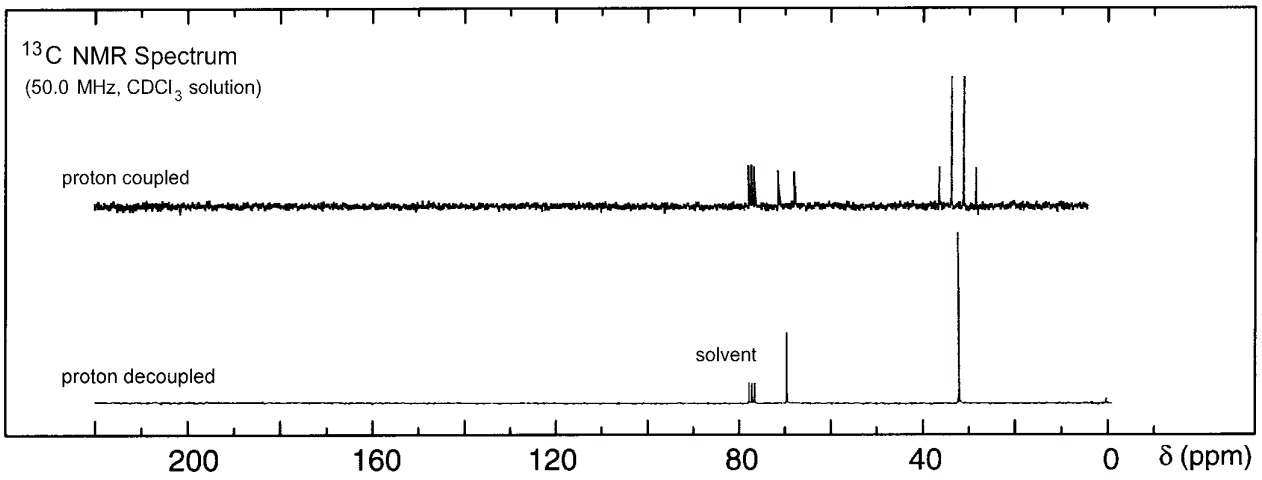

1H NMR Spectrum
(200 MHz, CDCl3 solution)
10
9
8
7
6
5
4
3
2
1
0
δ (ppm)

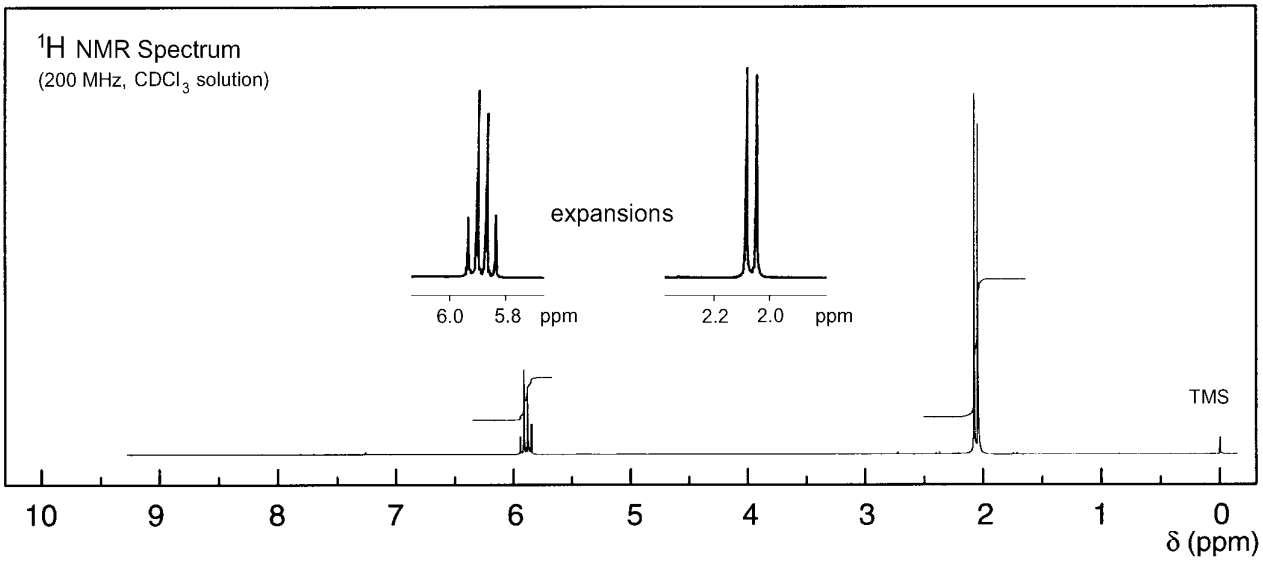
Problem 13



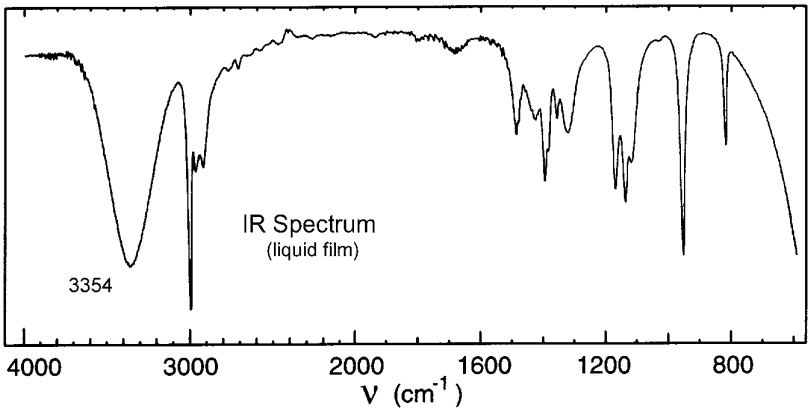


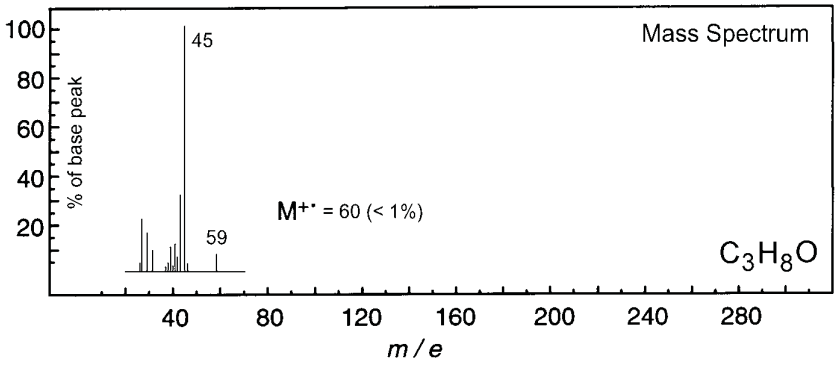
No significant UV absorption above 220 nm



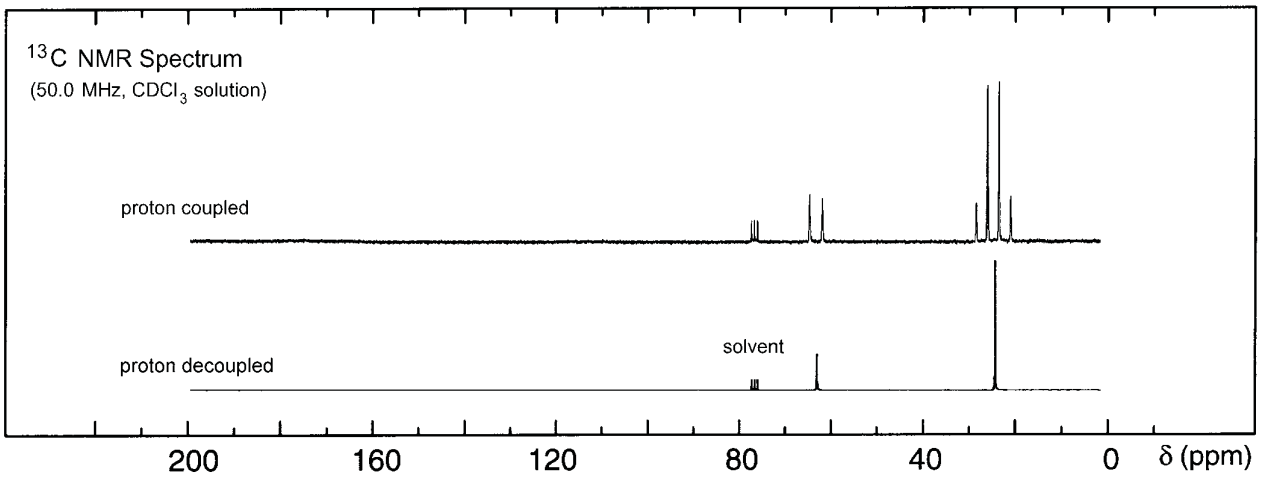


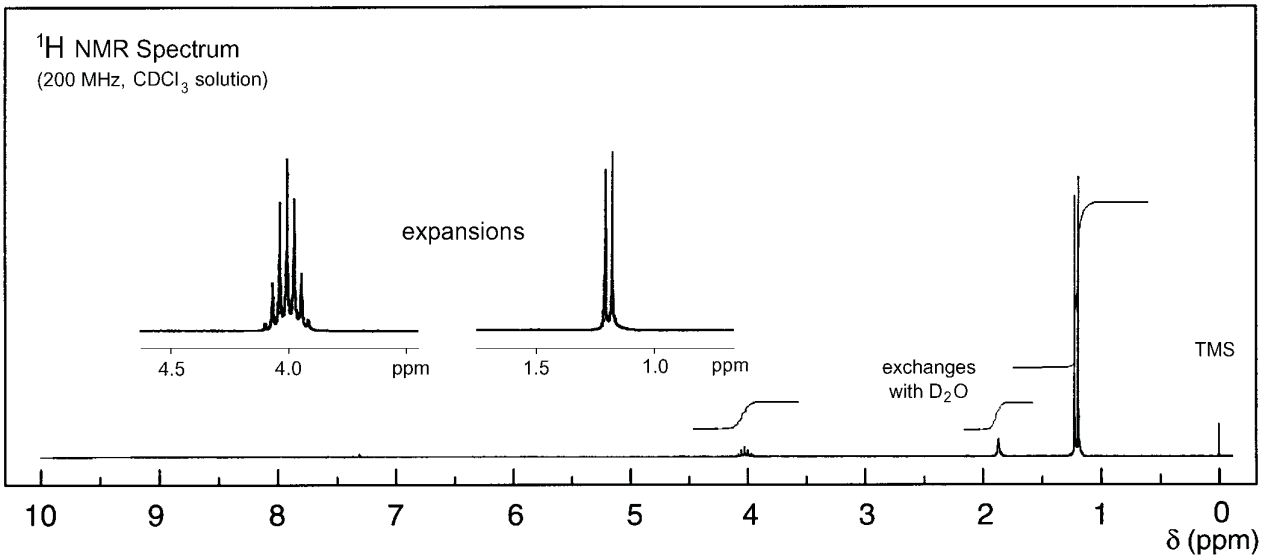
Problem 14



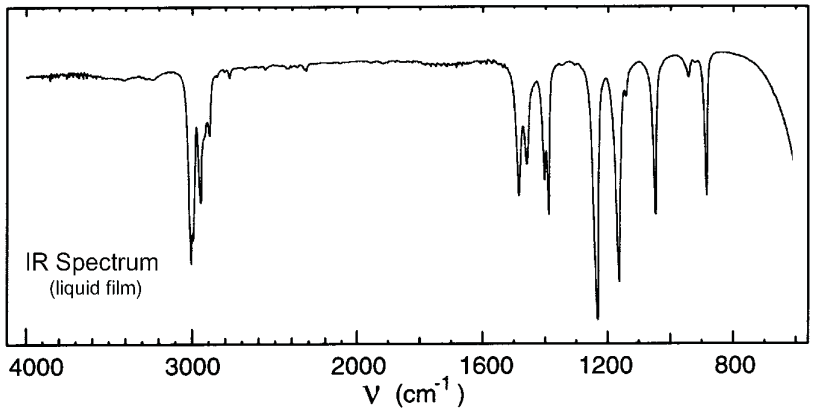


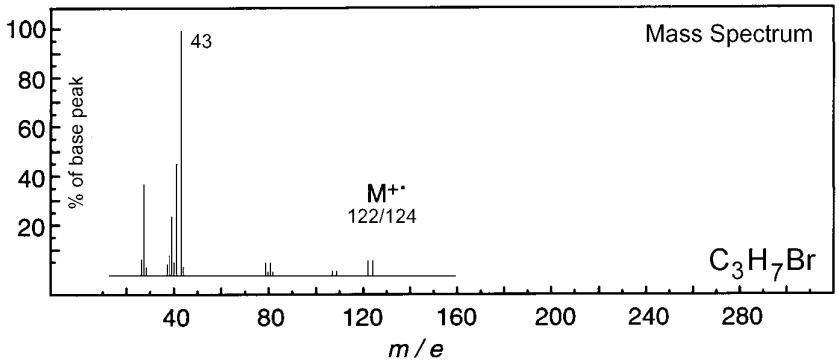
No significant UV absorption above 220 nm



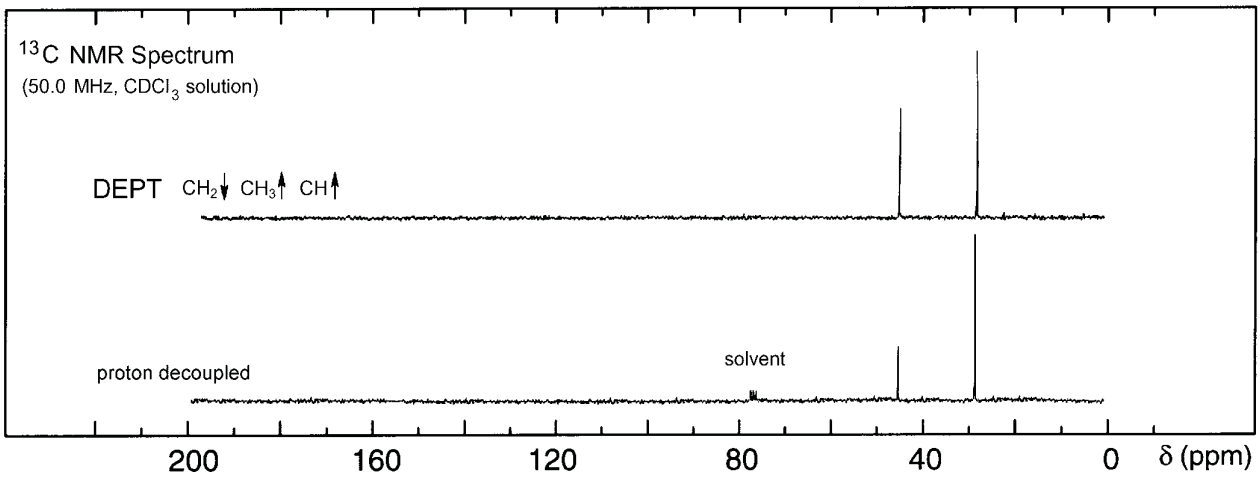


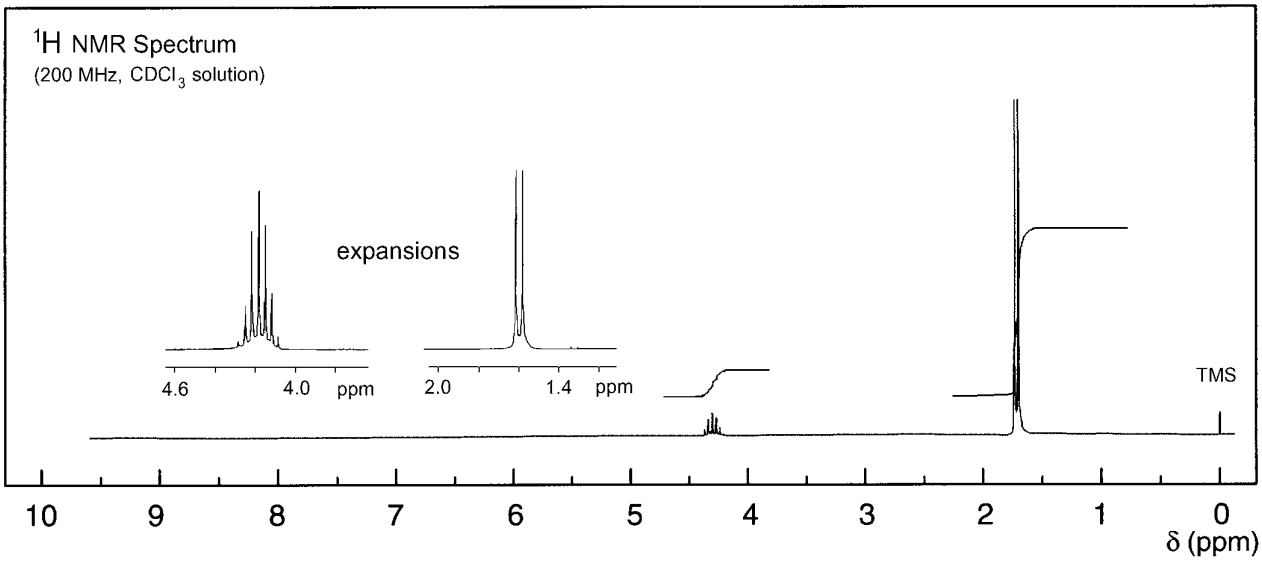
Problem 15



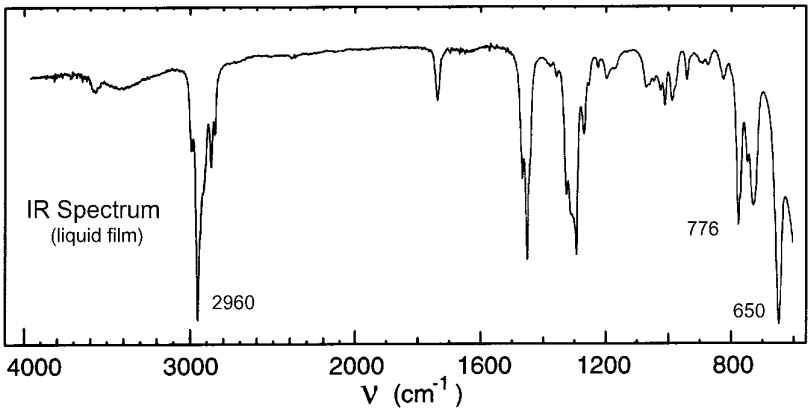


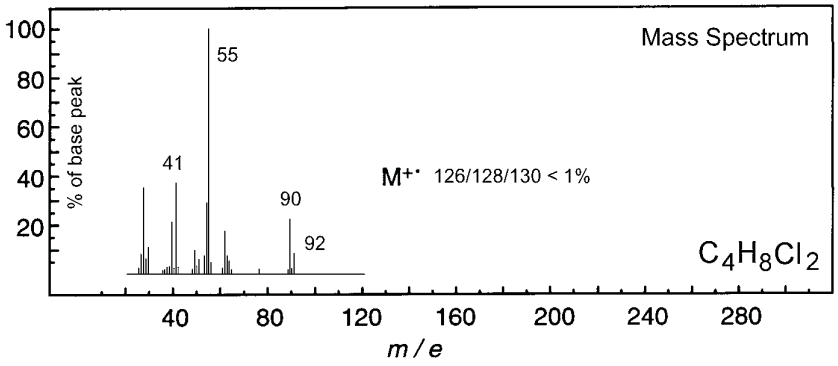
No significant UV absorption above 220 nm



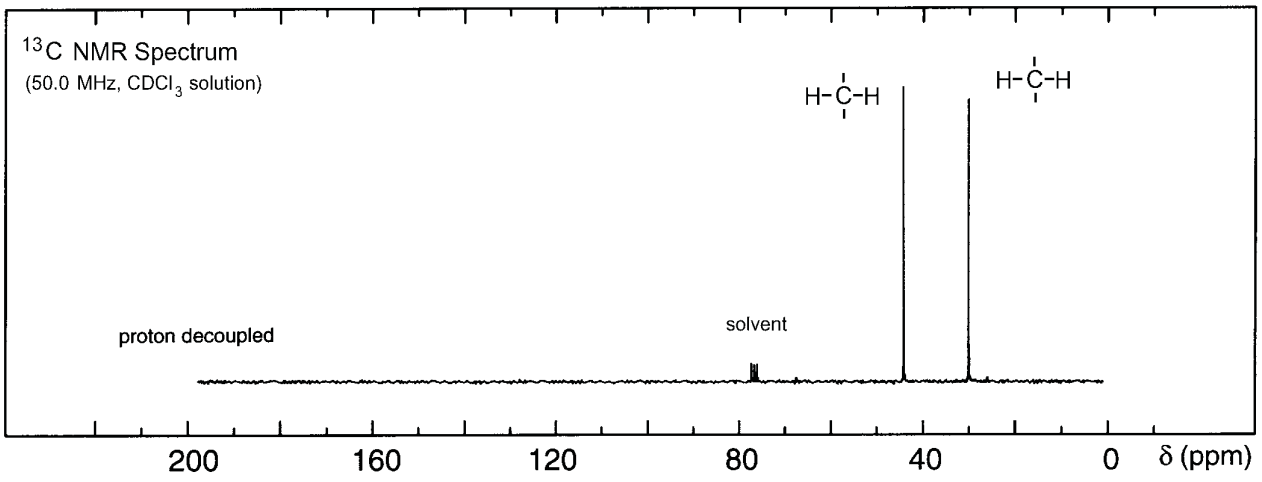


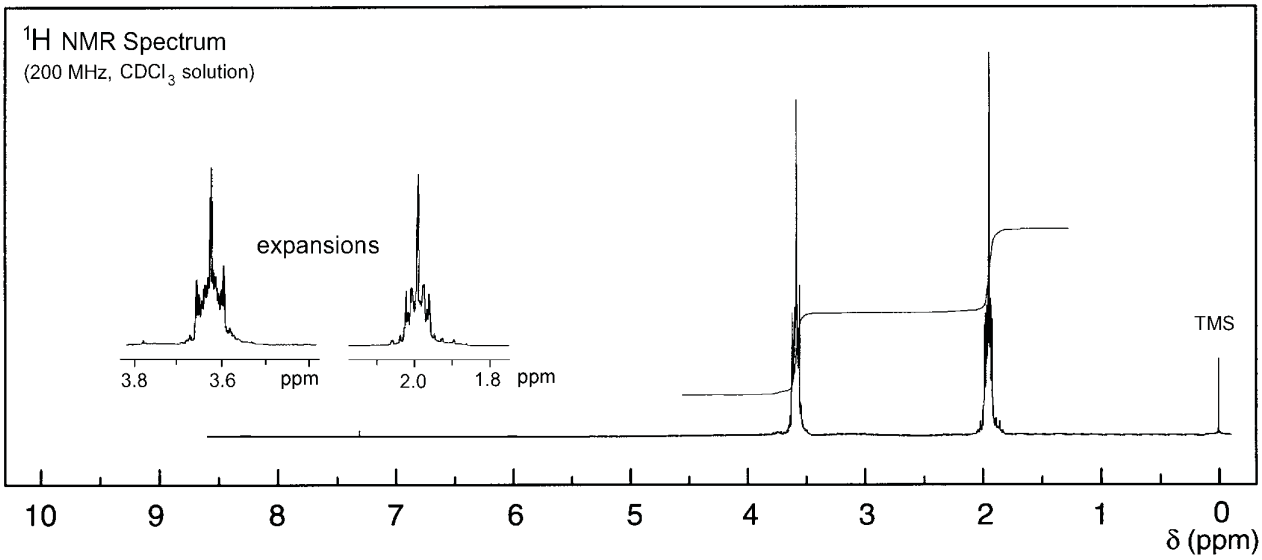
Problem 16



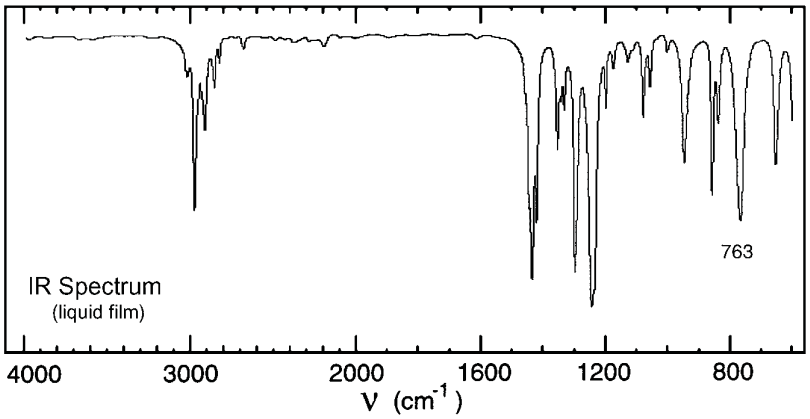


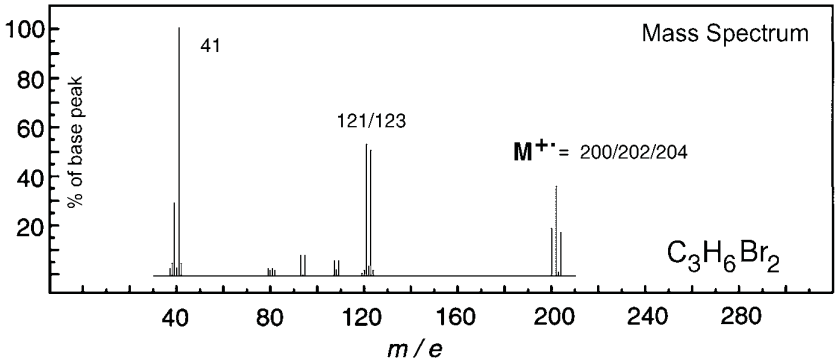
No significant UV absorption above 220 nm



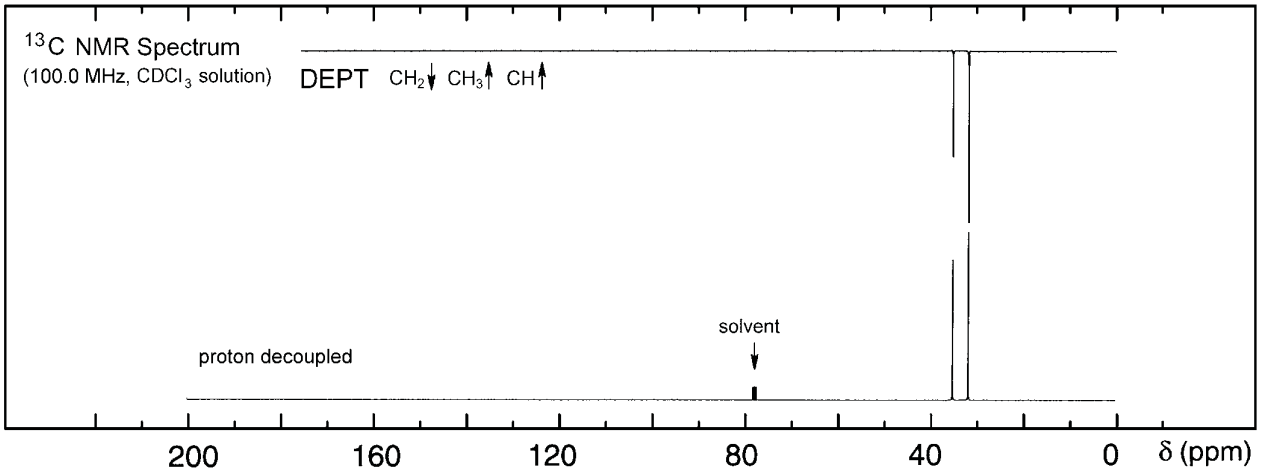


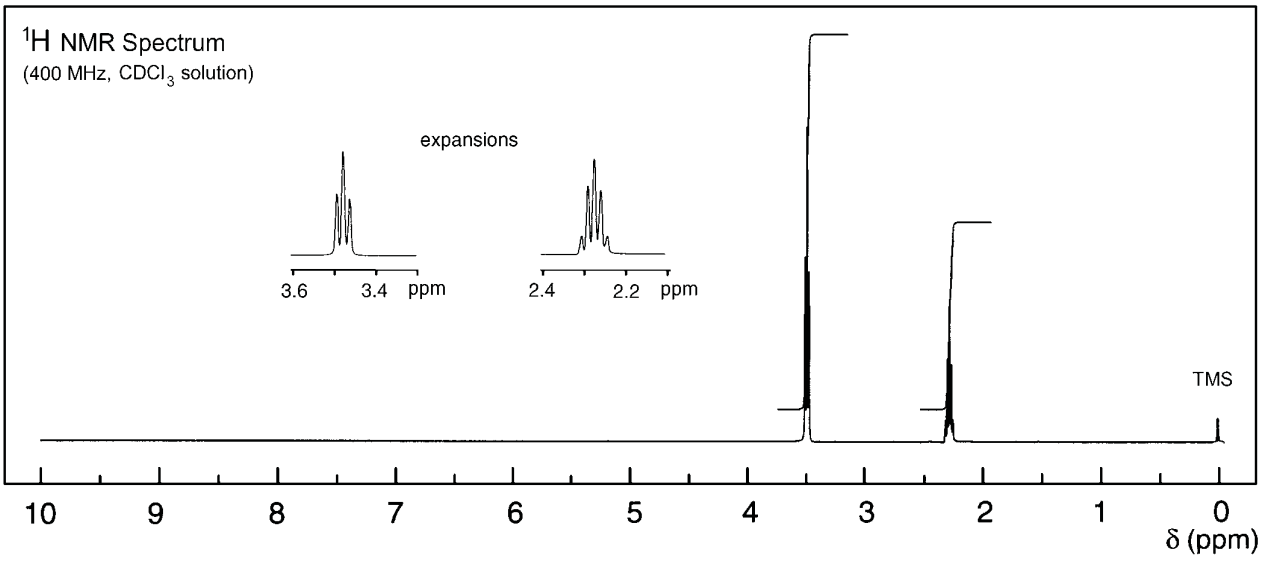
Problem 17



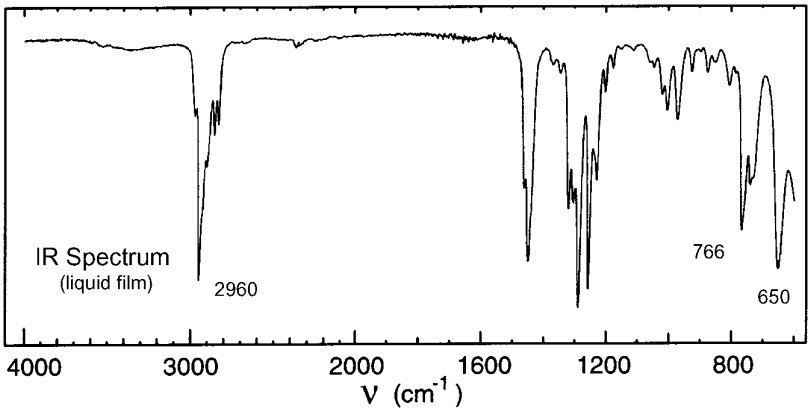


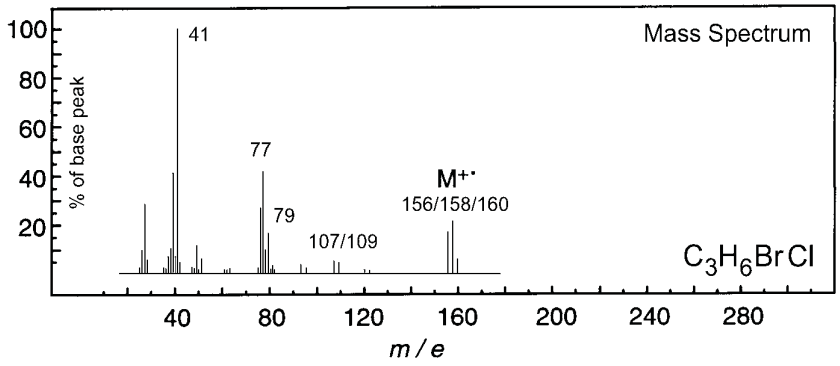
No significant UV absorption above 220 nm



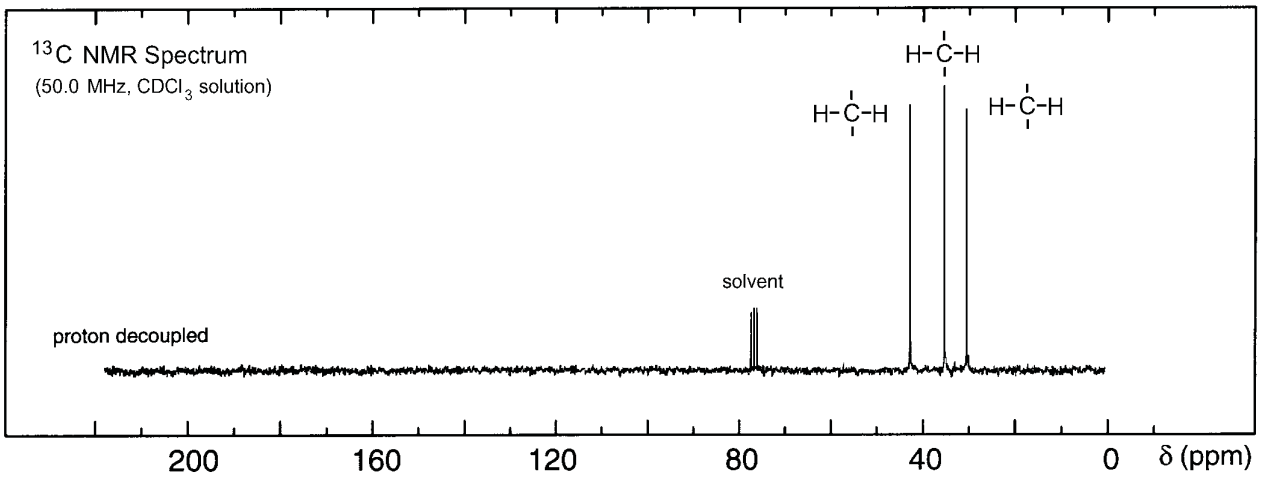


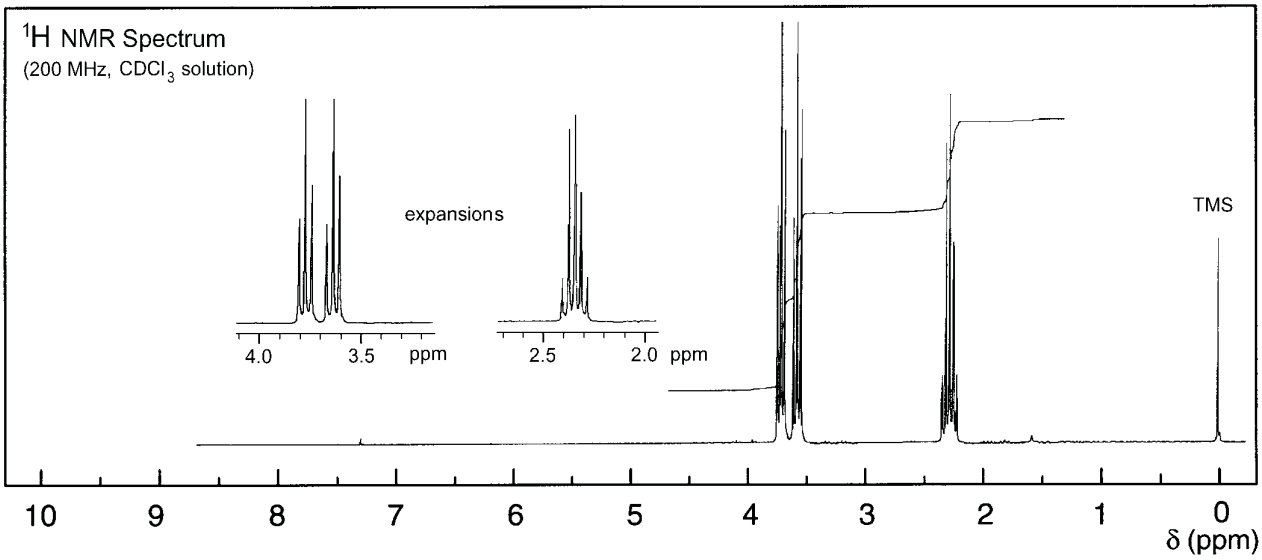
Problem 18



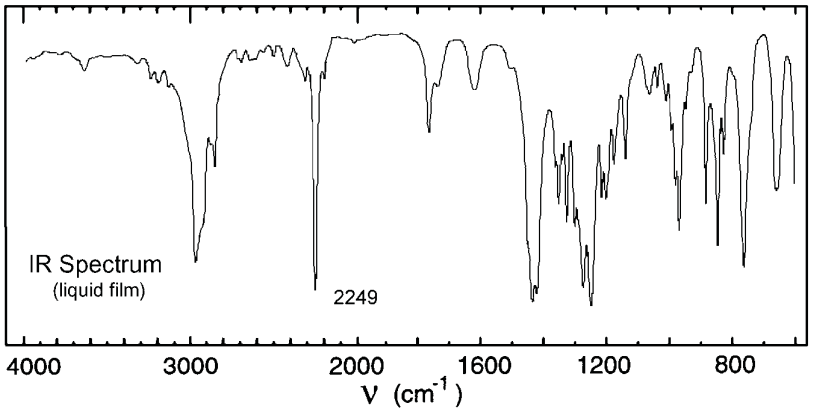


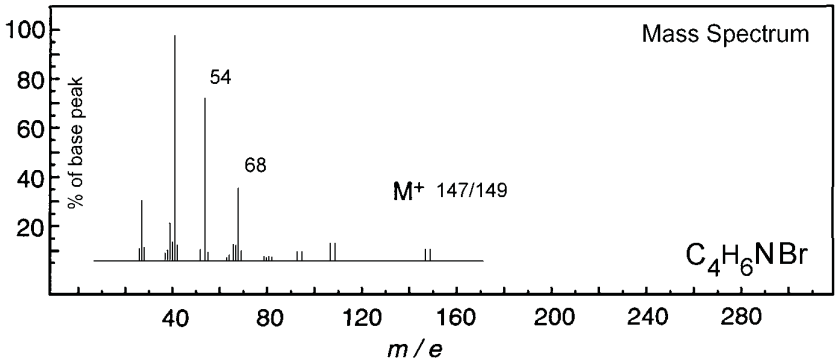
No significant UV absorption above 220 nm



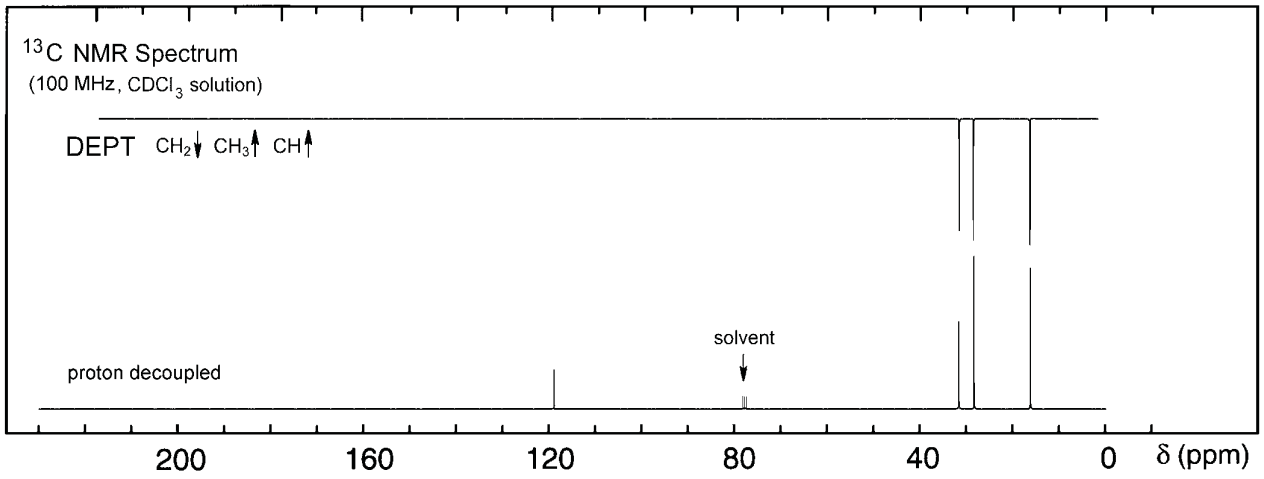


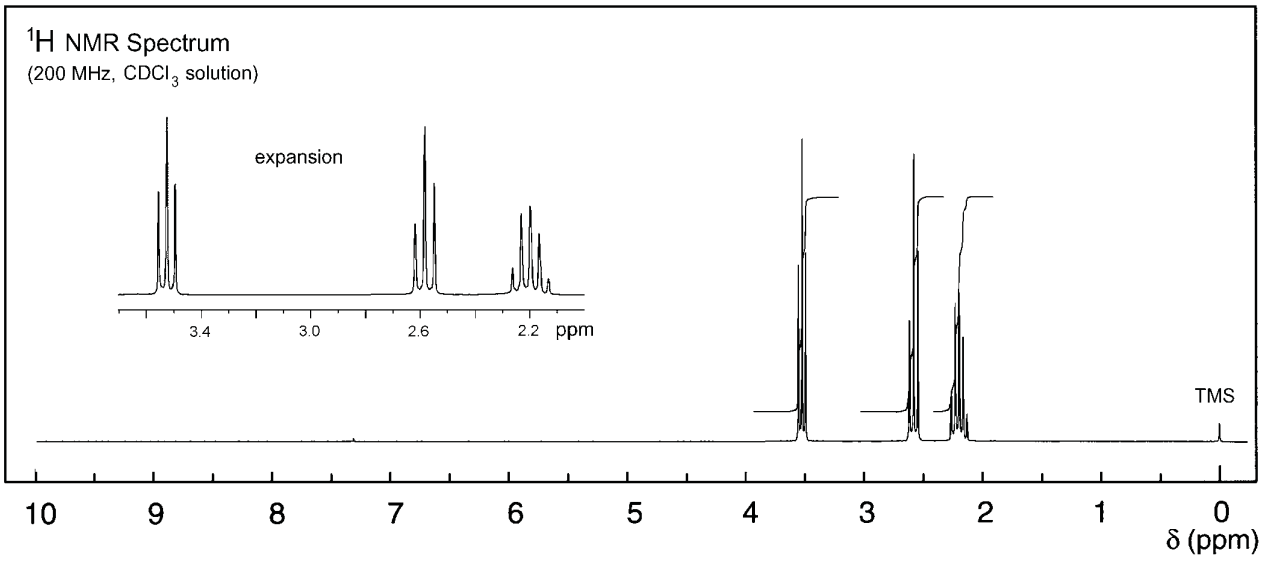
Problem 19



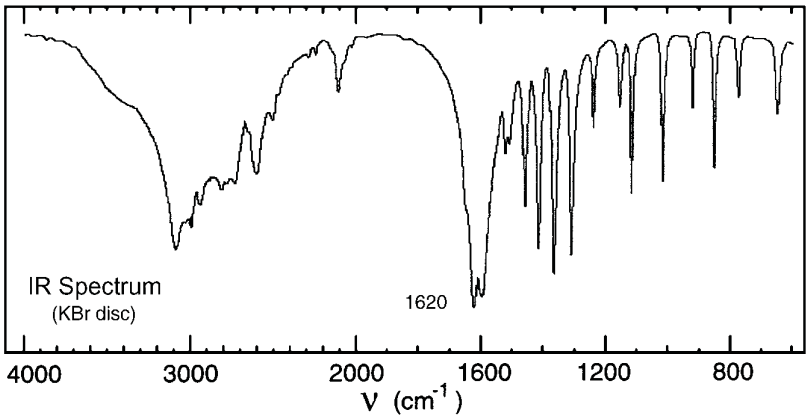


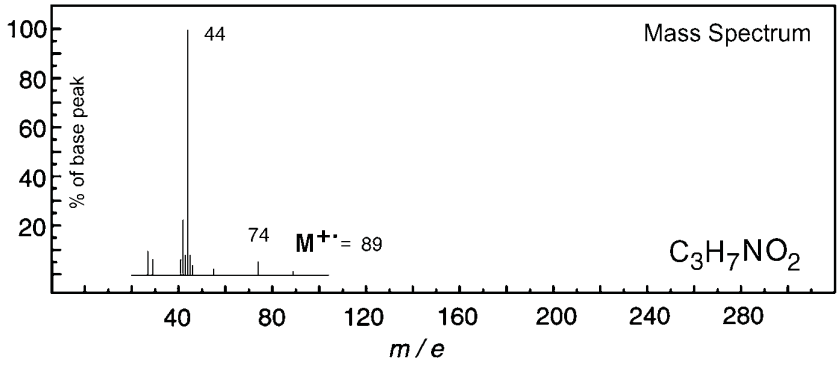
No significant UV absorption above 220 nm



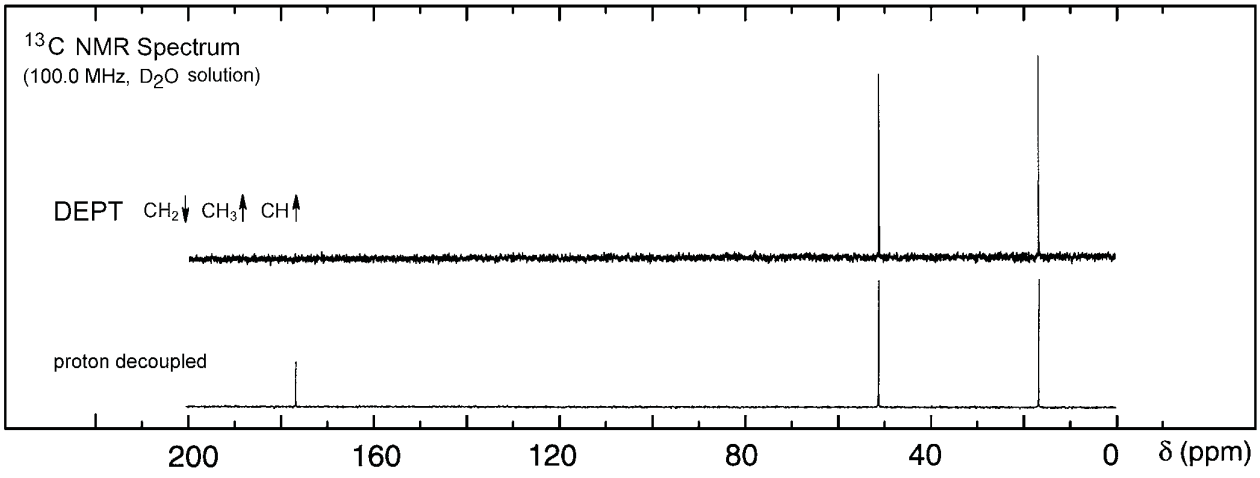


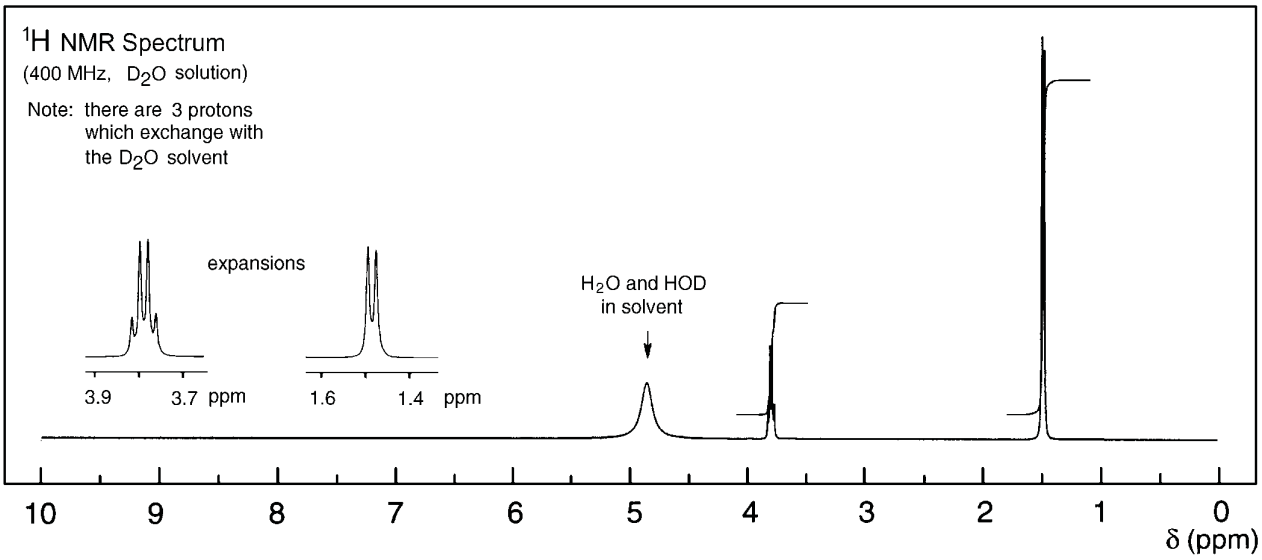
Problem 20



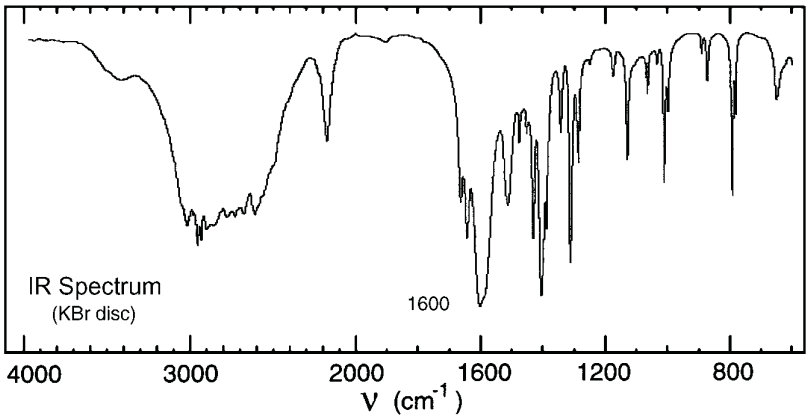


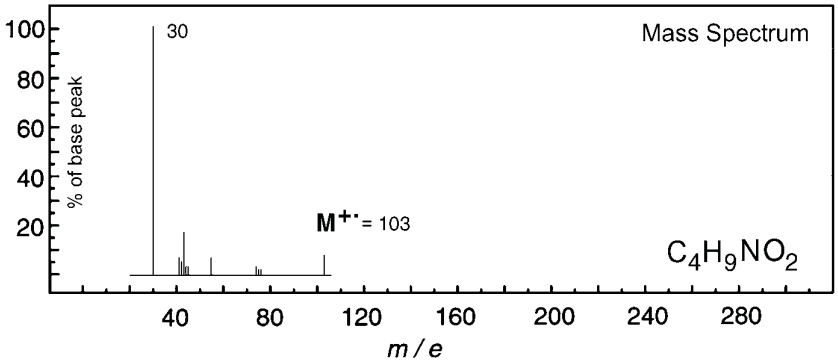
No significant UV absorption above 220 nm



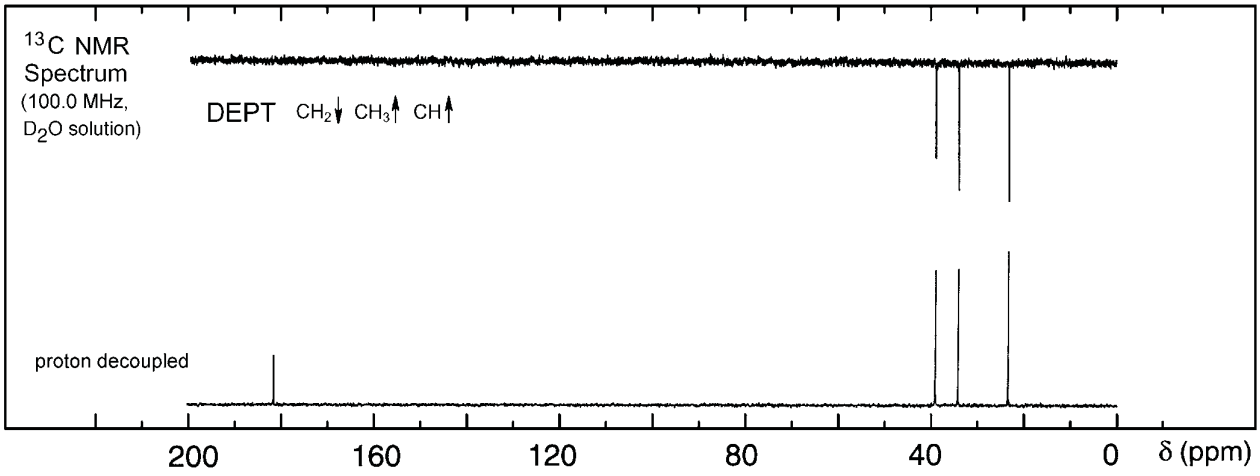


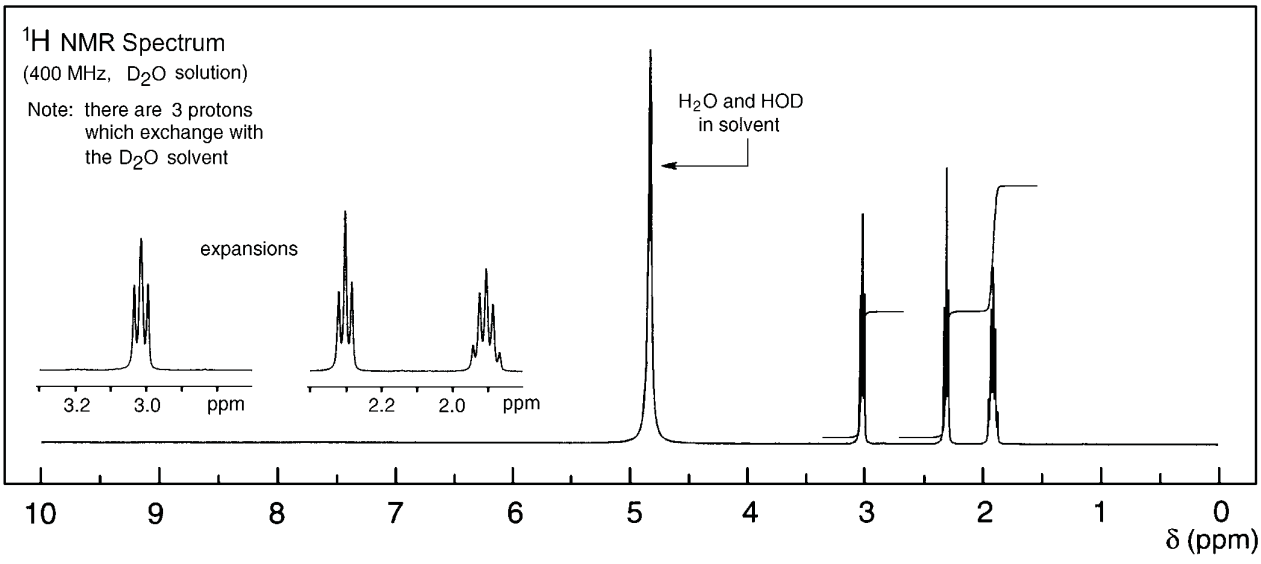
Problem 21



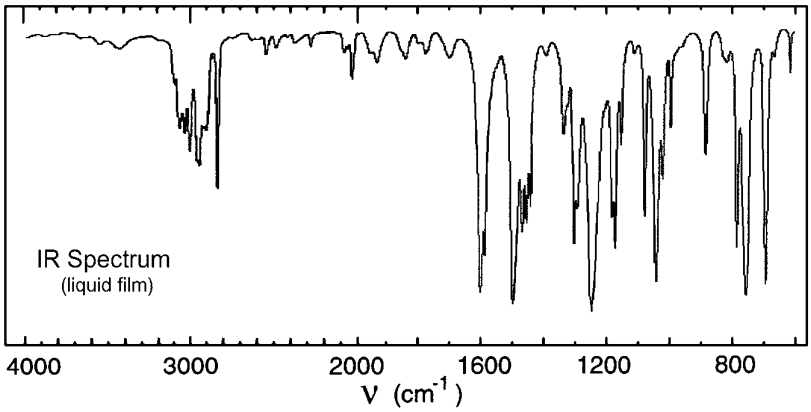


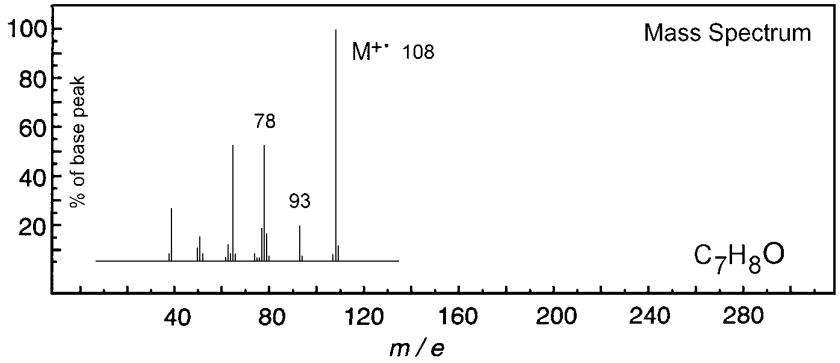
No significant UV absorption above 220 nm





Problem 22

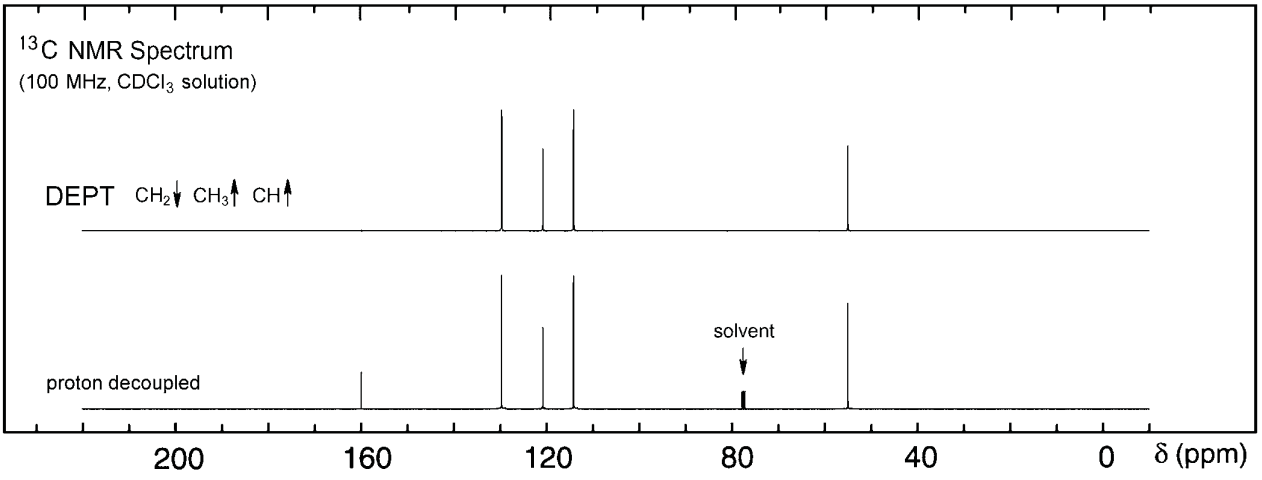


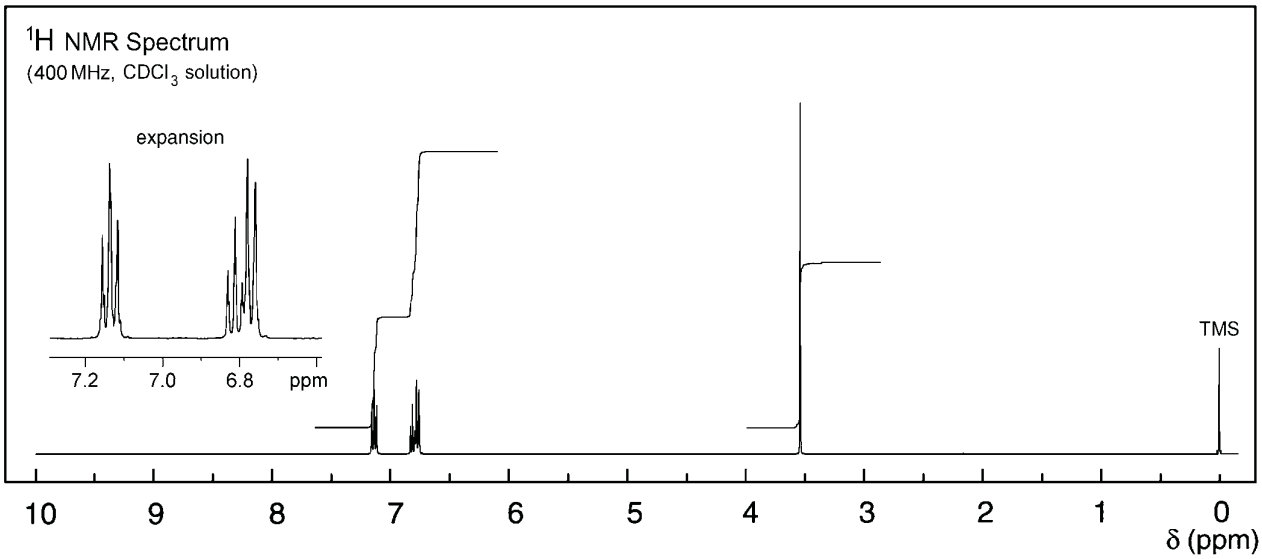


UV Spectrum

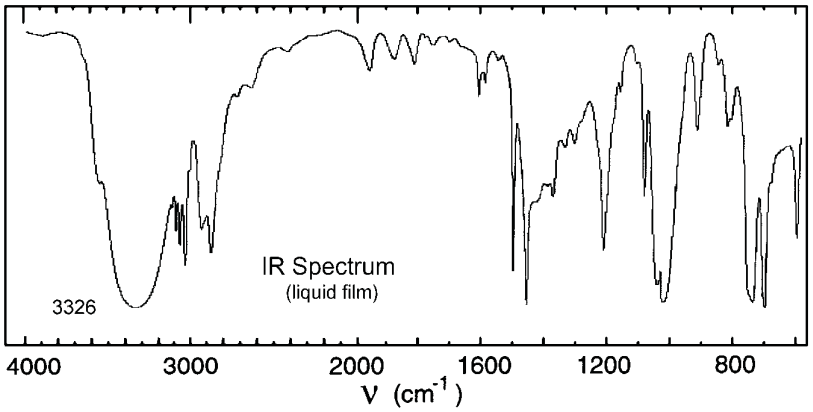
λ_{max} 269 nm ($\log_{10}\varepsilon$ 3.2)

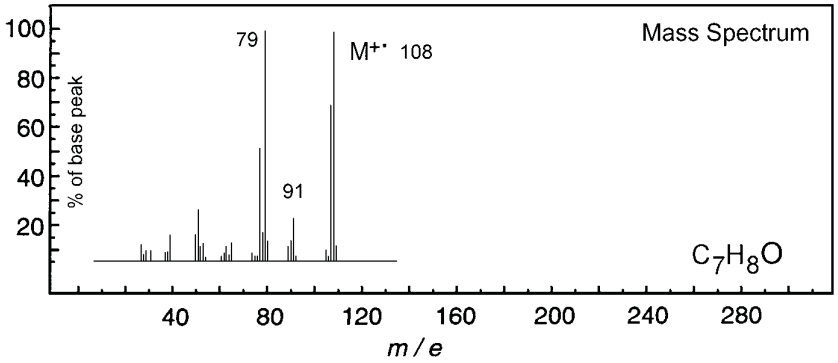
solvent : methanol





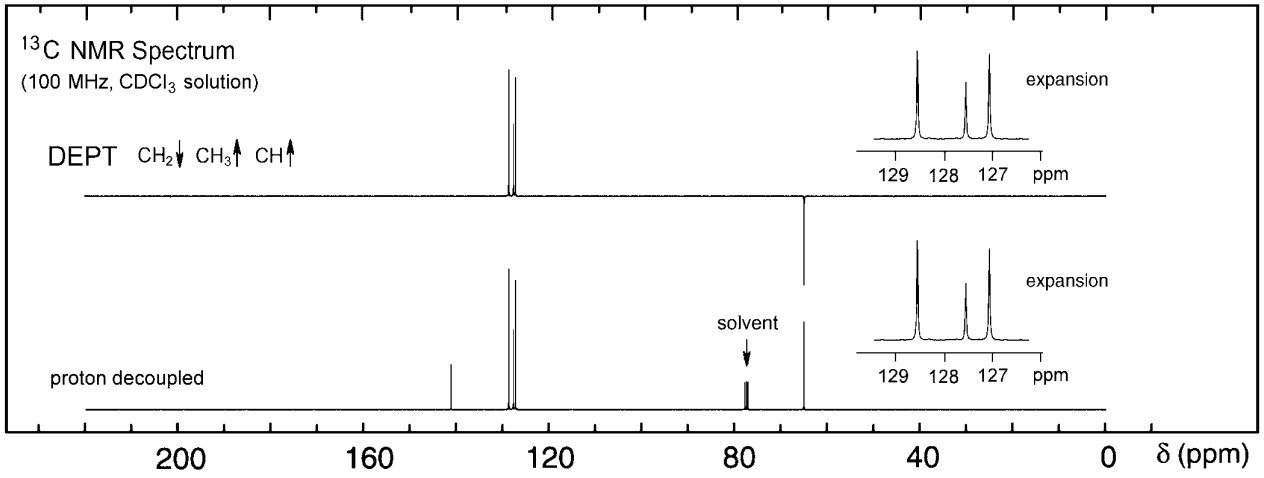
Problem 23

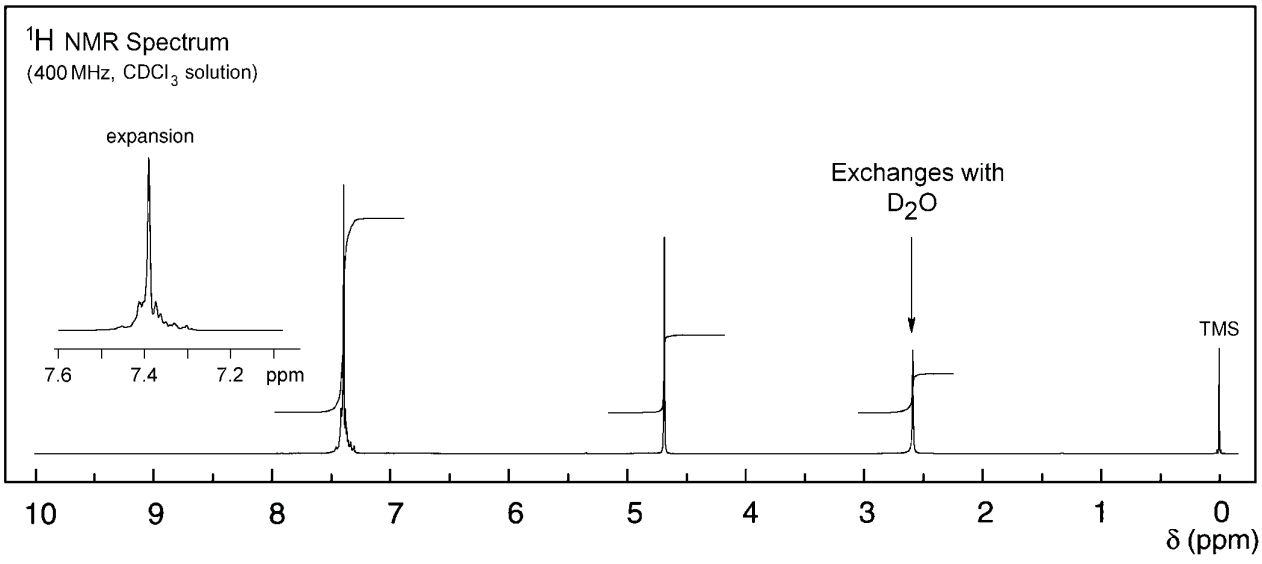




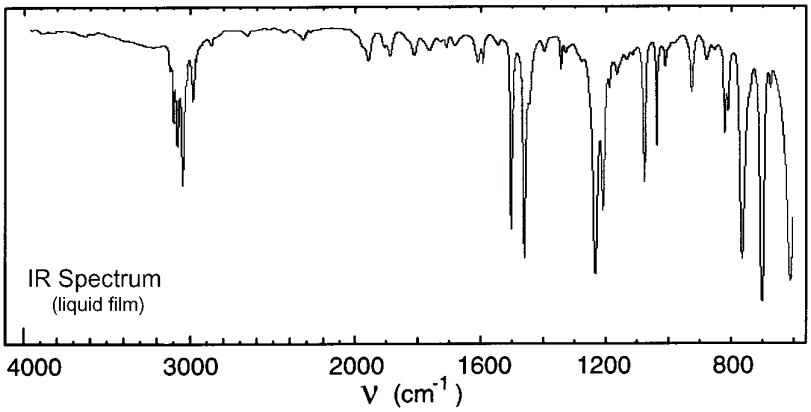
UV Spectrum

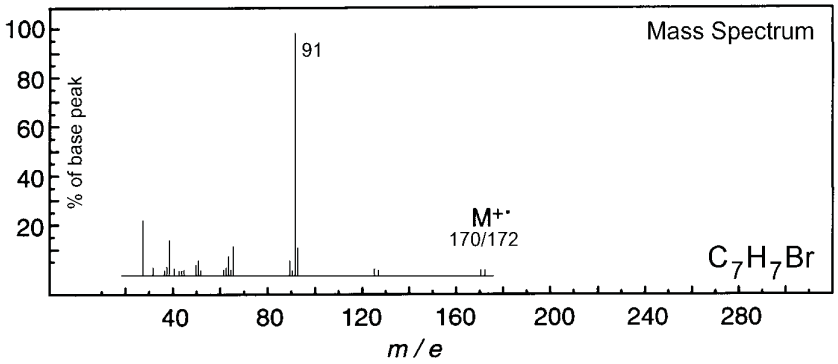
λ_{max} 243 nm ($\log_{10}\varepsilon$ 1.9)
λ_{max} 248 nm ($\log_{10}\varepsilon$ 2.1)
λ_{max} 252 nm ($\log_{10}\varepsilon$ 2.2)
λ_{max} 258 nm ($\log_{10}\varepsilon$ 2.3)
λ_{max} 264 nm ($\log_{10}\varepsilon$ 2.1)
λ_{max} 268 nm ($\log_{10}\varepsilon$ 1.9)
solvent : ethanol

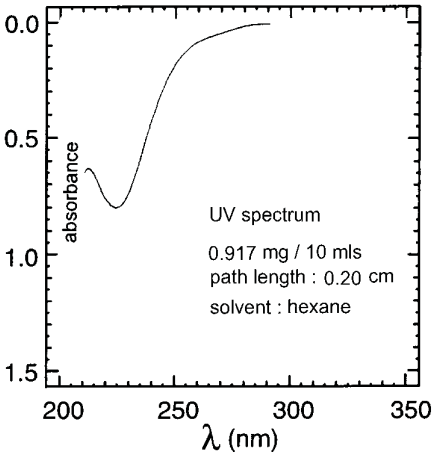


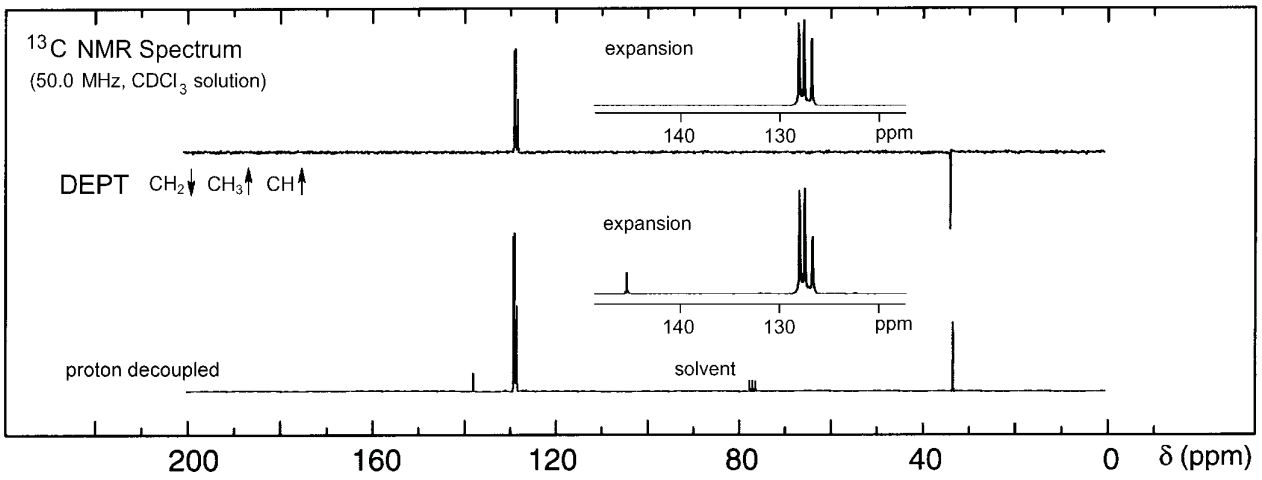


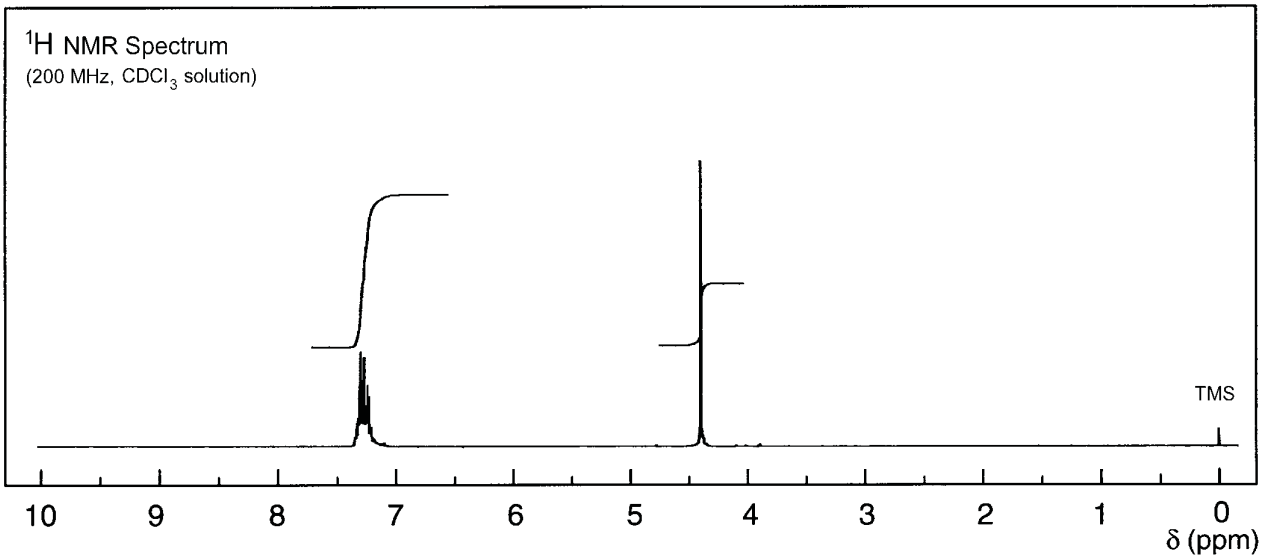
Problem 24


IR Spectrum
(liquid film)
4000
3000
2000
1600
1200
800
ν (cm-1)

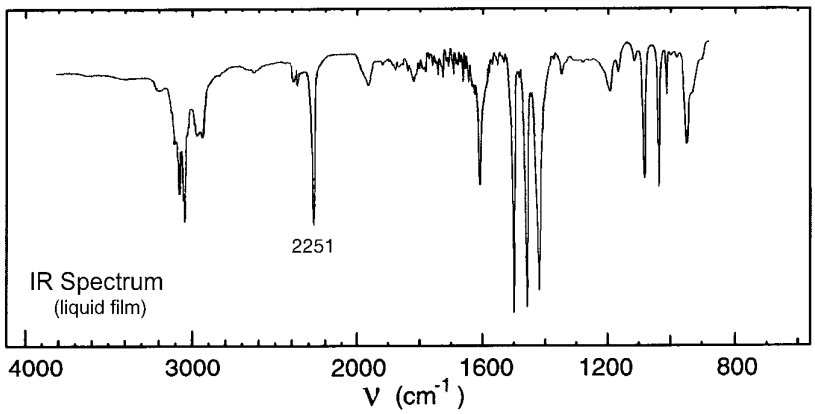

Mass Spectrum
% of base peak
91
M+·
170/172
C7H7Br
m/e

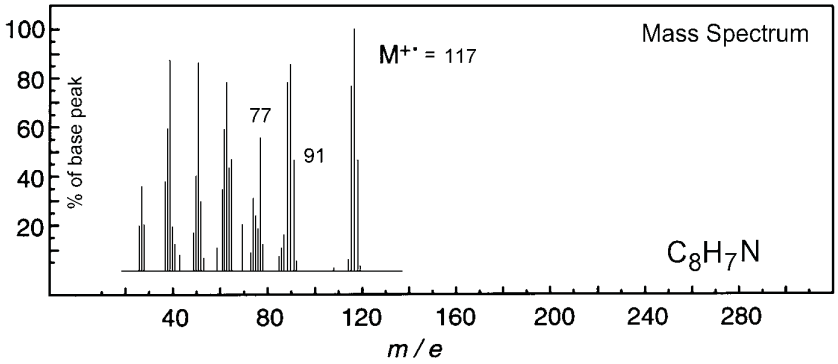

absorbance
UV spectrum
0.917 mg / 10 mls
path length : 0.20 cm
solvent : hexane
λ (nm)

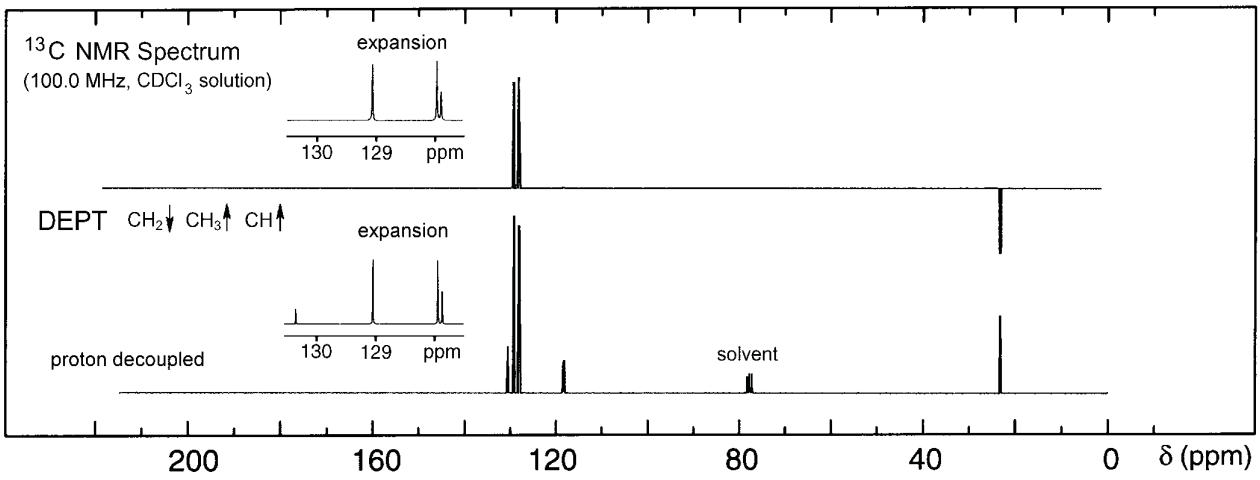

13C NMR Spectrum
(50.0 MHz, CDCl3 solution)
expansion
DEPT CH2 CH3 CH
proton decoupled
solvent
δ (ppm)

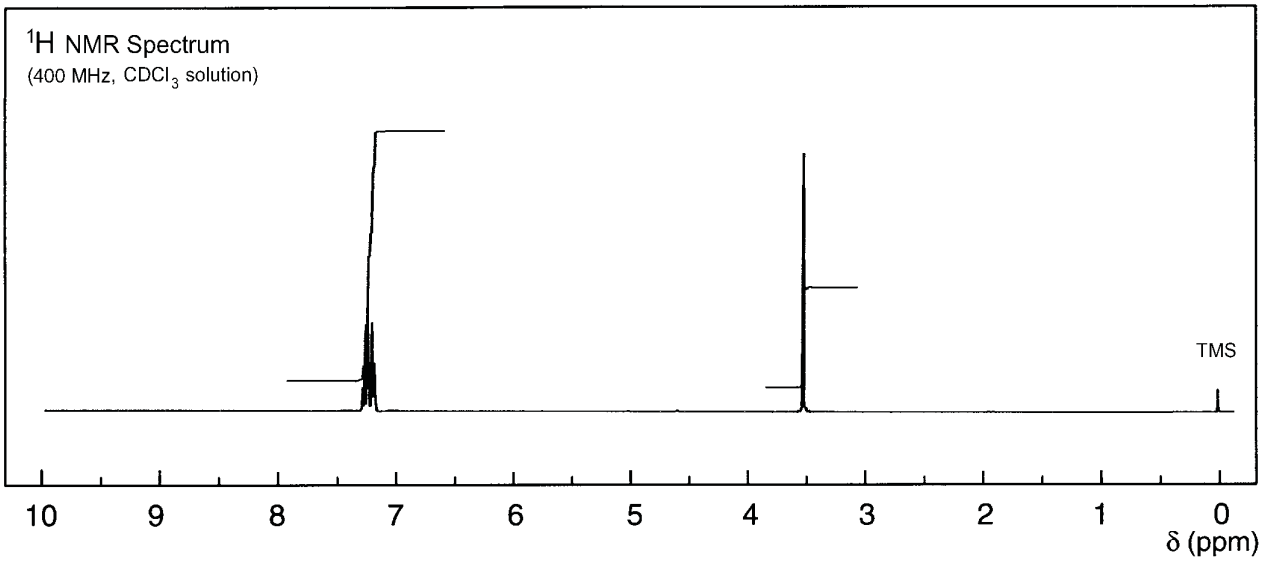

1H NMR Spectrum
(200 MHz, CDCl3 solution)
TMS
δ (ppm)

Problem 25

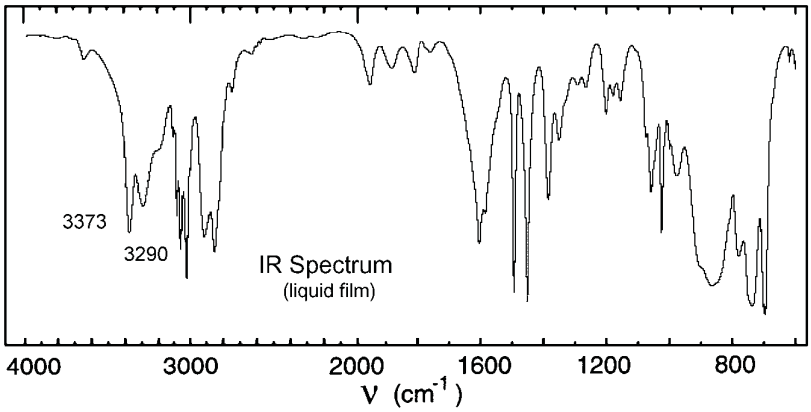

2251
IR Spectrum
(liquid film)
4000
3000
2000
1600
1200
800
ν (cm-1)

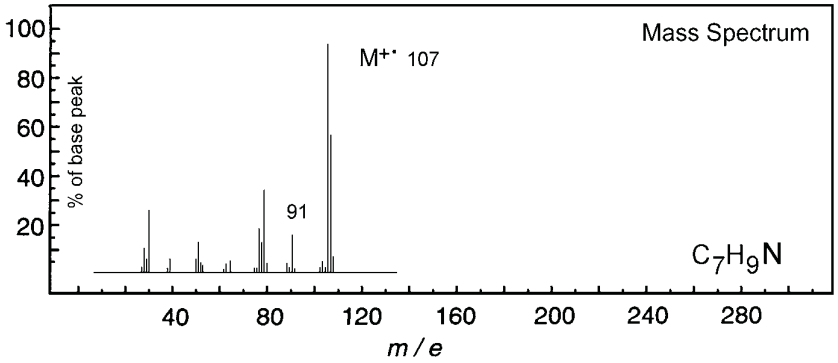

Mass Spectrum
M+· = 117
77
91
% of base peak
100
80
60
40
20
C8H7N
40
80
120
160
200
240
280
m/e


13C NMR Spectrum
(100.0 MHz, CDCl3 solution)
expansion
130
129
ppm
DEPT CH2 CH3 CH
expansion
proton decoupled
solvent
200
160
120
80
40
0
δ (ppm)


1H NMR Spectrum
(400 MHz, CDCl3 solution)
TMS
10
9
8
7
6
5
4
3
2
1
0
δ (ppm)

Problem 26



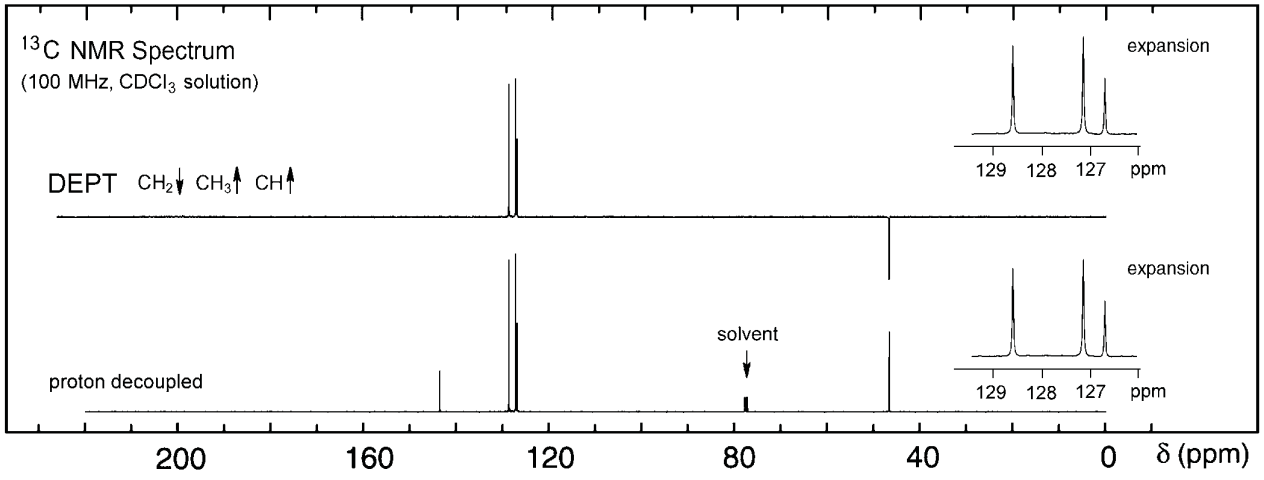


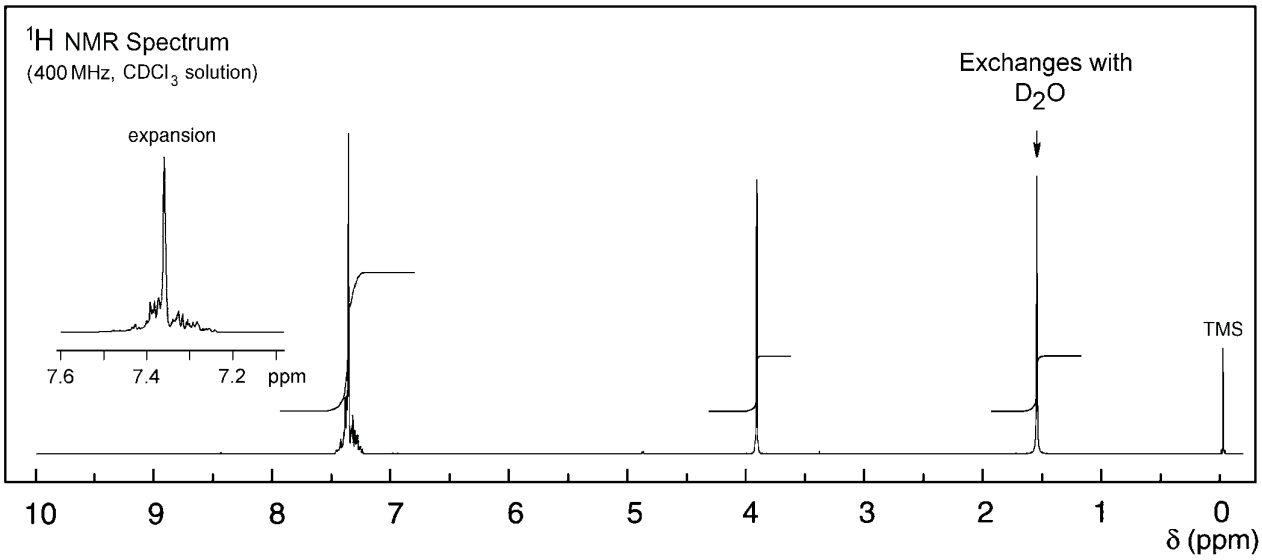
UV Spectrum

λ_{max} 256 nm ($\log_{10}\varepsilon$ 2.2)

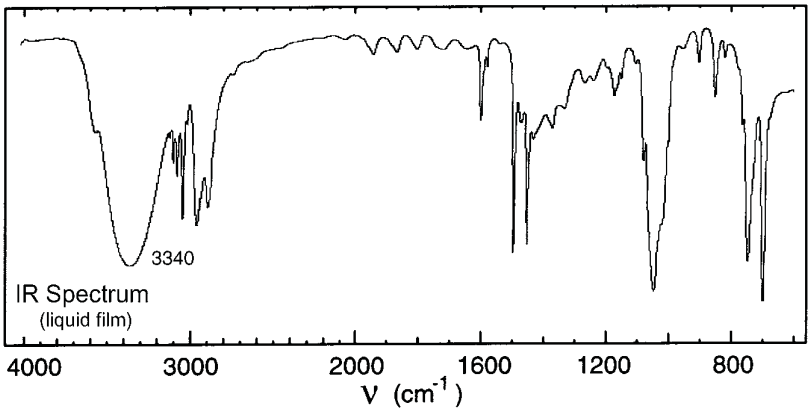
λ_{max} 264 nm ($\log_{10}\varepsilon$ 2.1)

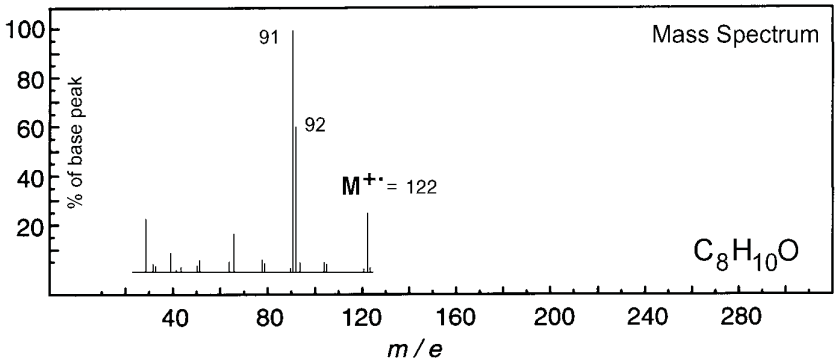
solvent : ethanol

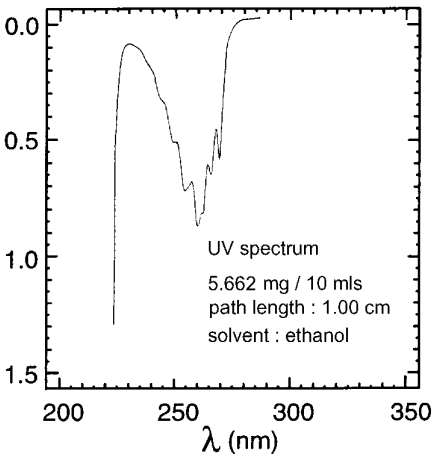


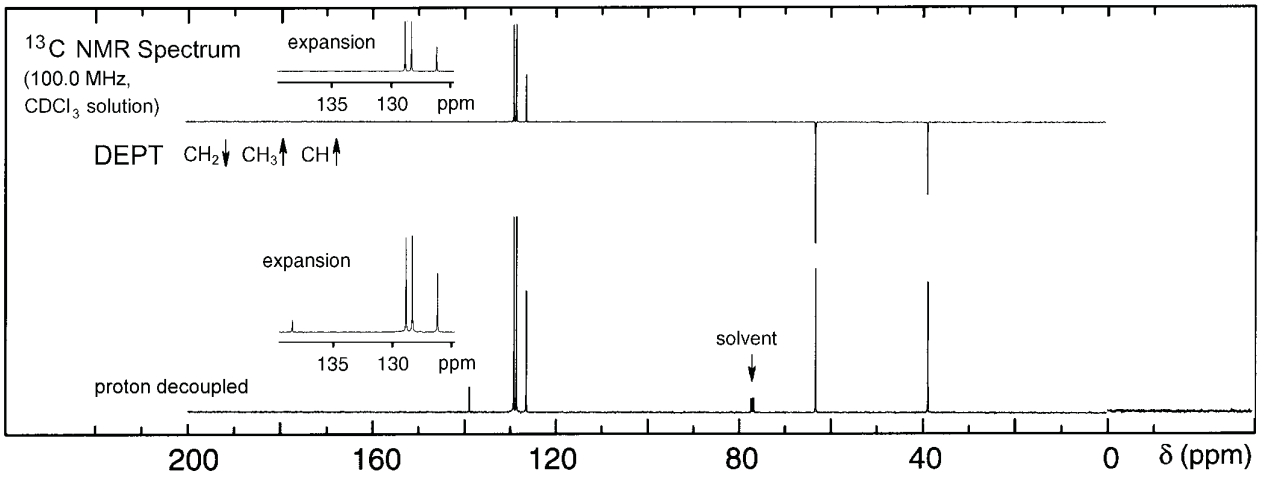


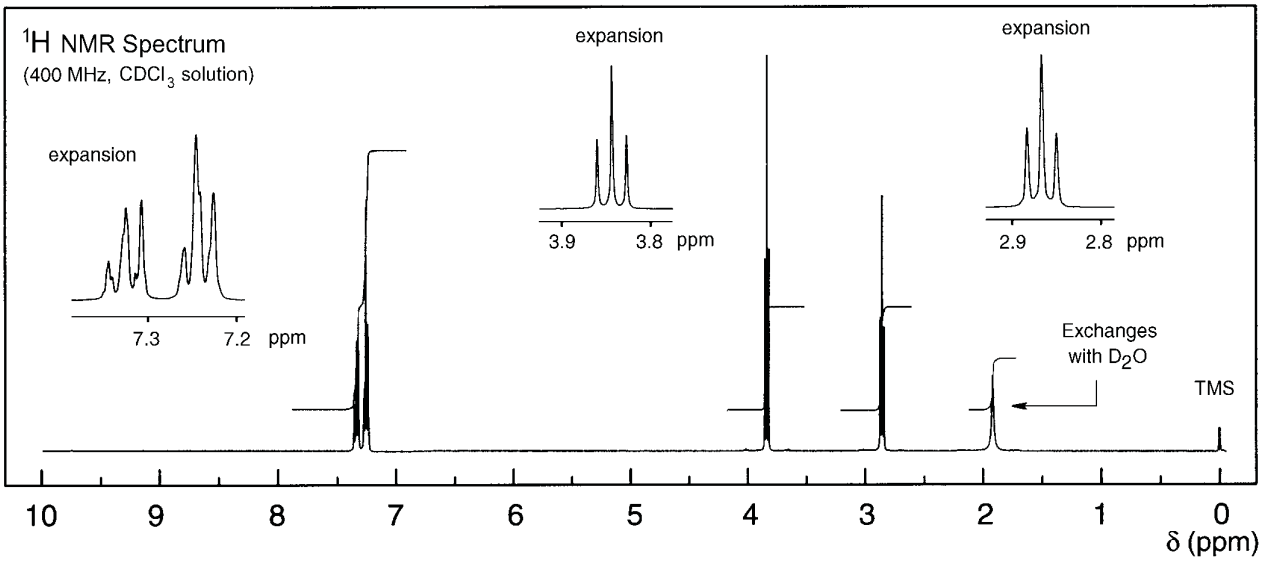
Problem 27


3340
IR Spectrum
(liquid film)
4000
3000
2000
1600
1200
800
ν (cm-1)


Mass Spectrum
% of base peak
91
92
M+· = 122
C8H10O
40
80
120
160
200
240
280
m/e


UV spectrum
5.662 mg / 10 mls
path length : 1.00 cm
solvent : ethanol
0.0
0.5
1.0
1.5
200
250
300
350
λ (nm)


13C NMR Spectrum
(100.0 MHz,
CDCl3 solution)
expansion
135 130 ppm
DEPT CH2 CH3 CH
expansion
135 130 ppm
solvent
proton decoupled
200
160
120
80
40
0
δ (ppm)


1H NMR Spectrum
(400 MHz, CDCl3 solution)
expansion
7.3 7.2 ppm
expansion
3.9 3.8 ppm
expansion
2.9 2.8 ppm
Exchanges
with D2O
TMS
10
9
8
7
6
5
4
3
2
1
0
δ (ppm)